

BY DEPLOYING WEAPONS IN SPACE, IS THE UNITED STATES
OPENING A THEATER OF ENGAGEMENT THAT COULD
DISADVANTAGE THE UNITED STATES
IN THE LONG TERM ?

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Military Space Applications

by

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The opinions and conclusions expressed herein are those of the student author and do not necessarily represent the views of the U.S. Army Command and General Staff College or any other governmental agency. (References to this study should include the foregoing statement.)

ABSTRACT

BY DEPLOYING WEAPONS IN SPACE, IS THE U.S. OPENING A THEATER OF ENGAGEMENT THAT COULD DISADVANTAGE THE U.S. IN THE LONG TERM?, by Maj Regis Baldauff, 104 pages.

Since man's initial contact with space in 1957, the U.S. and Russia have flirted with putting weapons in space. Today, two camps exist in the space weapons debate: sanctuary and weaponization. The sanctuary camp argues that space should remain free of weapons because it is in the best interest of the United States. The weaponization camp feels the U.S. dependence on space is too great to leave assets there unprotected. Weaponization is especially important because of the large dependence of the U.S. military on space for force enhancement purposes. This thesis examines some of the major arguments by evaluating them against the U.S. instruments of national power: diplomatic, information, military, and economic. According to this thesis' research, deploying weapons in space would disadvantage the United States in the long term. The evaluation of the options presented in chapter 3 led to the choice of continuing research and development with a limiting treaty (Option 3A) as the highest scoring option.

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TABLE OF CONTENTS

	Page
THESIS APPROVAL PAGE	ii
ABSTRACT	iii
ACKNOWLEDGMENTS	iv
ACRONYMS	vi
TABLES	viii
CHAPTER	
1. INTRODUCTION	1
2. LITERATURE REVIEW	10
3. RESEARCH METHODOLOGY.....	14
4. ANALYSIS	19
5. CONCLUSIONS AND RECOMMENDATIONS	78
REFERENCE LIST	95
INITIAL DISTRIBUTION LIST	104

ACRONYMS

ABL	Airborne Laser
ABM	Antiballistic Missile
AFDD	Air Force Doctrine Document
ASAT	Antisatellite
AWACS	Airborne Warning and Control System
BMD	Ballistic Missile Defense
BMDO	Ballistic Missile Defense Organization. Formally Strategic Defense Initiative Organization
DoD	Department of Defense
FOBS	Fractional Orbital Bombardment System
GPS	Global Positioning System
ICBM	Inter Continental Ballistic Missile
INMARSAT	International Maritime Satellite Organization
<i>JV 2020</i>	<i>Joint Vision 2020</i>
KE	Kinetic Energy
LEO	Low Earth Orbit
MIRACL	Mid-Infrared Chemical Laser
NMD	National Missile Defense. Replaced Strategic Defense Initiative
NORAD	North American Aerospace Defense Command
RFI	Frequency Interference
SBLRD	Space Based Laser Readiness Demonstrator
SDI	Strategic Defense Initiative

SDIO	Strategic Defense Initiative Organization
TMB	Theater Ballistic Missiles
UAV	Unmanned Aerial Vehicle
USCINCSpace	Commander in Chief, United States Space Command
USSR	United Soviet Socialists Republic. Now known as Russia.

TABLES

Table	Page
1. Evaluation Matrix.....	16
2. Weighted Results	92
3. Unweighted Results	92

CHAPTER 1

INTRODUCTION

The Research Question

The purpose of this thesis is to try and answer the question: By deploying weapons in space, is the U.S. opening a theater of engagement that could disadvantage the U.S. in the long term?

Some secondary research questions that need to be considered or limited are:

1. Will weapons in space stabilize or destabilize national security and the world balance of power? (Stabilize/Destabilize--in this paper, destabilize is referring to infringing on the current U.S. status as “lone superpower.” The United States currently has no peer competitors and the “Cold War” is considered over.) By not deploying weapons in space, is the U.S. providing potential adversaries sanctuary from which to attack with impunity? Will weapons in space deter or compel competition from potential enemies that would not have existed otherwise?

2. What are other options to weapons in space (air based, ground or sea based, conventional, electronic warfare, etc.)?

3. Do weapons in space enhance or detract from U.S. National Security (i.e., does a loss of space functions affect warfighting capabilities)?

4. Will deploying weapons in space create a new “space race” in the next ten years? What nations would potentially be involved in such a race?

5. What would the impacts of deployment be to relations with allies, neutrals, and enemies? To answer this question, the thesis will explore the most typical country in each category (i.e., ally--Canada).

6. Does the U.S. have such a lop-sided advantage with their robust space systems that countries may unilaterally develop negation measures?

7. Is an attack on U.S. space assets (civil, commercial, or government) considered an act of war? Can the U.S. respond with current capabilities? This is an area currently fraught with confusion. Multinational corporations own some satellites, so they are not really “flagged” under a single country. Is an attack on a commercial French satellite an attack on the NATO alliance?

By answering the secondary questions in reasonable depth, the thesis will gather the necessary information to infer the answer to the primary research question.

Introduction

Man’s adventure in space began with the launch of Sputnik in 1957 from Baikonur Cosmodrome, Kazakhstan. Since then, nations of the world, especially the United States, have grown to rely on space-derived capabilities. Space capabilities are not simply necessary for the prosecution of war and protection of the great United States. They are key components of the United States’ robust national economy and strategy of “engagement and enlargement.” These extremely important resources have a key frailty: they cannot be rapidly reconstituted because of the cost and time it takes to integrate, checkout, and launch. Thus, it is extremely important these assets are protected. Countless leaders, including President Ronald Reagan, have called for deploying weapons in space in the past, but there has not been a lot of discussion on whether or not the capabilities the weapons will give the U.S. will outweigh the negative impacts they could have on overall security for the nation. During the Cold War, both the Soviet Union and the United States experimented with weapons capabilities in space. Those weapons

remain in the realm of research and development. If current trends hold, successful future military operations will be impossible without space capabilities (space superiority) employed on the battlefield.

The United States military depends on space derived information for weather forecasting, communications, theater and strategic missile warning, reconnaissance, surveillance, targeting intelligence, mapping, and navigation for vehicles and weapons to name a few. Weapons navigation is extremely important in the age where CNN controls public opinion. Laser-guided bombs do not work in bad weather situations. It is imperative to be able to launch Global Positioning System (GPS) guided munitions to avoid collateral damage and the subsequent damage to public opinion. The world's civilian population is also becoming dependent on the military GPS system for navigation and timing support.

There are other civilian dependencies as well. Worldwide banking transactions, global communications, and even population safety are other areas that rely heavily on space. The United States has protected its interests (military, economic, and political) in every area of responsibility to date by building and deploying weapons and forces to protect its interests in the traditional areas of operation: air, land, and sea. If history is any measure, weapons in space will someday follow. However clear the future looks from the historical perspective, the United States has not yet made the doctrinal leap. According to the Commander-in-Chief, United States Space Command (USCINCSpace) General Ralph E. Eberhart, "I believe its obvious to all--short of deciding we're going to weaponize space--that we must be committed to space control, that we must be able to prevent use of space and protect our use of space" (Scott 2001, 80). There are tremendous

political and economic constraints to deploying weapons in space, such as starting another weapons race. Also, the United States is a signatory to various treaties that impact this issue. The Outer Space Treaty and the Anti-ballistic missile treaty for example both have provisions limiting deployment of certain weapons in space. The impact to the current national security environment may not be mitigated by potential security gains offered by space weapons. The current national policy in *Joint Vision 2020* (JV 2020) on information operations shows the importance of U.S. space assets to the future, “The joint force of 2020 will use superior information and knowledge to achieve decision superiority, to support advanced command and control capabilities, and to reach the full potential of dominant maneuver, precision engagement, full dimensional protection, and focused logistics”(JV 2020 2000, 7). Space systems are a foundational element of information superiority that is key in *Joint Vision 2020*. The U.S. Commission on National Security, twenty-first century report *Seeking a National Strategy*, lists “control of access to outer space” (p. 6) as a critical national interest and as a key objective:

Key Objectives. First, to defend the United States and ensure that it is safe from the dangers of a new era.

The protection of U.S. and international access to outer space and cyberspace must become a high priority of U.S. security planning. Outer space and cyberspace are the main arteries of the world’s evolving information and economic systems, and the ability to move ideas and information through them freely is a prerequisite for expanding global freedom and prosperity. Secure access to outer space and cyberspace is also now the sine qua non of the U.S. military’s ability to function effectively. Through both technological and diplomatic means, the United States needs to guard against the possibility of “breakout” capabilities in space or cyberspace that would endanger U.S. survival or critical interests. (U.S. Commission on National Security Strategy, 8)

Threats to U.S. space-based infrastructure need to be addressed. This may be best done through weapons in space. The threats may be best addressed through air- or ground-based options.

In a recent *Aviation Week and Space Technology* article, USCINCSpace General Ralph E. Eberhart addressed potential negation options. He listed the preferable options in this order: diplomatic means (i.e., “shutter control”), jamming uplinks and downlinks, attacking ground stations, and other actions short of blowing something up in space (Scott 2000, 80). Building and deploying weapons in space will be prohibitively expensive compared to ground-based options. Space weapons have some key attributes that make them attractive, despite the cost. The options listed above, other than the diplomatic option, require an overt act of aggression. An aircraft has to be launched into another country’s sovereign territory to bomb a ground station. Although still considered an act of war, attacking a target in space does not violate another country’s sovereignty in a traditional sense and is less provocative than directly attacking another country.

The thesis will answer the research question by examining the positive and negative consequences of a decision to deploy weapons in space within the framework of the Instruments of National Power: diplomatic, informational, military, and economic.

Key Definitions

Counterspace. According to Air Force Doctrine Document (AFDD) 1, “Those offensive and defensive operations conducted by air, land, sea, space, special operations, and information forces with the objective of gaining and maintaining control of activities conducted in or through the space environment” (AFDD 1 1997, 80).

Deployment. Deployment of space weapons refers not only to stationing weapons in orbit above the earth, but also positioning rapidly reconstitutable resources on launch platforms for on-demand deployment.

Diplomatic. A nation's diplomatic instrument of power "promotes and protects its purposes and interests with other nations" through "negotiations, recognition, treaties and alliances" (Davis, Dorf, and Walz 2000, L1-A-12).

Disadvantage. For the purpose of this thesis, disadvantage is being used to imply a negative impact on one or all of the U.S. instruments of national power--political, military, or economic

Economic. The economic instrument of power is used to "protect industries and markets, improve quality of life of their people, to stabilize the economy and government of their friends and allies, and to deter destabilizing and hostile actions by other nation states. This is done through two main methods: incentives and disincentives" (Davis, Dorf, and Walz 2000, L1-A-15)

First Strike. First strike refers to launching a preemptive strike on the adversaries space systems and weapons in order to negate the impact on your own.

Informational. The informational tool of national power refers to "the conscious use of communications to inform foreign publics regarding U.S. policies and actions for the purpose of affecting these publics in ways favorable to U.S. national interests through public diplomacy, public affairs, and psychological operations activities" (Davis, Dorf, and Walz 2000, L1-A-13).

Instruments of Power. There are four instruments of national power commonly recognized. The thesis will use definitions provided by Lieutenant Colonel (Retired) Ted

Davis, Robert H. Dorf, and Lieutenant Colonel (retired) Robert D. Walz, USA, in an article written for the U.S. Army's Command and General Staff College.

Military. The military tool of national power is “the collection of a nation’s weapons and equipment, trained manpower, organizations, doctrines, industrial base and sustainment capacity” (Davis, Dorf, and Walz 2000, L1-A-14). This instrument of national power is used for domestic purposes to protect the U.S. nation, but also to project power abroad.

Space Control. According to AFDD 1, “Operations to assure friendly use of space environment while denying its use to the enemy. Achieved through offensive and defensive counterspace carried out to gain and maintain control of activities conducted in or through the space environment” (AFDD 1 1997, 84).

Space Superiority. According to AFDD 1, “Degree of control necessary to employ, maneuver, and engage space forces while denying the same capability to an adversary” (AFDD 1 1997, 85).

Theater. According to AFDD1, “The geographical area outside the continental United States for which a commander of a combatant command has been assigned responsibility” (AFDD 1 1997, 86)

Weapons. In the context of weapons for this thesis, weapons are systems that have an offensive or defensive capability, not systems that simply provide input to offense or defense operations like weather, navigation, or future capabilities like AWACS in space.

Limitations

The thesis will be constrained by about a six-month period of research and limited to doctrine and documents developed and available to that point. It will be limited to

unclassified sources only due to availability of classified materials and the national security implications of the issue.

Delimitations

The technical feasibility of placing weapons in space is an important issue, but is outside of the scope of this paper. The United States and Soviet Union have tested space weapons in the past. The technology, although crude, was demonstrated. The thesis will also not address the economic feasibility of deploying weapons in space. Economic feasibility of deploying weapons in space should be addressed as a separate topic. The topic will also be limited to documents available in English or English translations and available by late January. An important dimension of the topic is comparing the development of space power theory with that of air and sea power theory. The thesis will attempt to bring out the important points in this area that pertain to weapons in space.

Significance of the Study

There is a lot of effort currently going into the development of theory and doctrine for space operations. These documents call for space control measures, though not necessarily for operations that must be carried out in space. General Ralph E. Eberhart, Commander-in-Chief, United States Space Command, said in an interview with *Aviation Week* recently,

If we only look at space in terms of “integration,” in my view, we’ll fall into the same trap we fell into with the airplane. We initially thought of it in terms of intelligence, surveillance, reconnaissance, communication and weather. If we only think of space in these ways, [it’s just] a “higher hill” as opposed to a center of gravity. We [also] have to be able to surveil, protect and negate under this space control mission. (Scott 2001, 80)

Here is another excellent example from the newest U.S. Space Command brochure:

In the future, being able to attack terrestrial targets from space may be critical to national defense. U.S. Space Command therefore is actively identifying potential roles, missions, and payloads for this probable new field of battle. Protecting the U.S. ability to launch and operate satellites--and denying an enemy the same ability--could be pivotal to the success of future U.S. military operations. The increasing reliance of joint forces on space means we must achieve "space superiority" in times of conflict. Likewise, we must be able to preserve civil and commercial access to space. (United States Space Command, Sec. 3)

The most recent research by the United States government was by the Commission to assess United States National Security Space Management and Organization. The executive summary sums up the issue very well.

The ability to restrict or deny freedom of access to and operations in space is no longer limited to global military powers. Knowledge of space systems and the means to counter them is increasingly available on the international market. The reality is that there are many extant capabilities to deny, disrupt or physically destroy space systems and the ground facilities that use and control them. Examples include denial and deception, interference with satellite systems, jamming satellites on orbit, use of microsatellites for hostile action and detonation of a nuclear weapon in space. (Commission to Assess United States National Security Space Management and Organization 2001,xiii)

There is a clear doctrinal call for weapons in space or terrestrial or airborne weapons that could enact similar effects. The commission does not limit the threat to large hostile nation but a multipolar threat. Many countries have the ability to effect the results listed in their summary. The U.S. has been experimenting with antisatellite (ASAT) and other space-based weapons technologies since the start of the space program. The weapons could take many forms. This thesis will put some thought into this future direction and the advantages and disadvantages of getting to a point where the U.S. could realize this vision. Following that will be a discussion of negative and positive implications and a recommendation for or against the deployment of weapons in space.

CHAPTER 2

LITERATURE REVIEW

The pertinent literature comes from a number of categories of sources. Space doctrine and policy from military, legal precedents and treaties, documentation of organizations dedicated to the peaceful uses of space as well as various historic commentaries.

Space Doctrine, Theory, and Policy

The thesis will use current Department of Defense (Dod) publications, vision statements, doctrine documents, and manuals to detail current requirements for the application of combat power “through or in space” (AFDD 1 1997, 80). This doctrine firmly calls for offensive and defensive capabilities in space and through space for a variety of missions. These requirements exist for current operations as well as visions for future force application. Some of these documents are: AFDD 1, *Air Force Basic Doctrine*; AFDD 2-2, *Space Operations*; *Joint Vision 2020*; *United States Space Command Vision 2020*; and *Space Power Theory*. This section of material will be augmented with speeches from various space and military leaders that examine the future of the military role in space, national space policy, and the exercise of space combat power.

The doctrine documents will be used to show current thinking and requirements. The vision statements will show the needs and requirements for the future, and James Oberg’s *Space Power Theory* will be used to frame many of the issues to be addressed in the body of the thesis.

Another important source is the report from the United States Commission on National Security, 21st Century. The commission's goal is to "develop an overview of U.S. strategic interests and objectives for the next 25 years. It will describe an overall national security philosophy and strategy to support those objectives and interests" (U.S. Commission on National Security, *New World Coming: American Security in the 21st Century*, iv). The first two phases of the commission have published reports. The information bears directly on the future of space defense requirements and other related trends effecting national security. The thesis will also cover pertinent United States government reports, such as yearly reports from DoD to Congress.

Thesis and Military Student Research

There are a large number of theses, monographs, and research papers written at the military service schools summarizing and discussing some of the major issues to be discussed in this thesis. Some of the major works to be cited are: "Weaponization of Space: Understanding Strategic and Technological Inevitabilities," *Shooting Down a Star* discussing ASAT weapons, *Counterspace Operations for Information Dominance*, *Space Control and the Role of Anti-Satellite Weapons*, *Does the United States Need Space-Based Weapons*, *Higher Eyes in the Sky: The Feasibility of Moving AWACS and JSTARS Functions into Space*, and *The Emergence of Space Power Thought*. The titles of these sources largely speak for themselves and the contributions they have made to space thought. These sources contain a large bulk of recent writings on the primary and secondary questions needed to successfully complete the thesis. Another source listed, *The Emergence of Space Power Thought* is a large collection of works on different issues

in the realm of space power and represents one of the largest collections of current issues in the field.

Some other theses completed in the early eighties have some excellent background data on the strategic defense initiative. This information offers excellent historical examples that can be used in the analysis.

Historical Works and Data

Some sources describe the historical background of the space weapons debate to help better frame the issues. *Way Out There in the Blue* discusses President Ronald Reagan and the decision to press ahead with the Star Wars development program. This is a key historical decision because it is similar in many ways to current decisions that must be resolved regarding space weapons issues. *Space Warfare* discusses early issues and basic theory of some of the original space weapons developed by the Soviet Union and United States.

Other Sources

There are many other sources that address these issues from other angles. Many Internet resources discuss the political fallout from a decision to deploy weapons in space as well as attempts to raise public consciousness. These sources will help show some of the public concern and reflect a lot of the international criticism that evolves around the issue of deploying weapons in space.

Summary

The references described above show a small fraction of sources currently available to shed light on this topic. There exists a large quantity of recent thought on

space weapons due to interest in deploying a missile shield to protect the United States against limited missile attacks from third world rogue states. Space weapons have also been the topic of a lot of new military doctrinal thought and have been reviewed extensively in professional journals and publications.

CHAPTER 3

RESEARCH METHODOLOGY

The research will begin by making an outline of the current list of primary and secondary questions and how they fit together. From this outline, the research can focus and begin the process of filling out the outline and revising the basic questions needed to answer in order to form the thesis. The primary and secondary questions may apply to each area of the model used to evaluate the thesis or apply to only a single category.

The thesis will then frame current doctrinal thought regarding space-related combat power, some known requirements for space related weapons, the needed offensive and defensive capabilities space weapons provide, as well as some historical background. This basis will help narrow the field to be addressed. The research into the primary and secondary questions will begin by analyzing available references from the Combined Arms Research Library and the Air University Library. Original sources used to develop those documents will complement the research. From this firm foundation of the different bodies of thought on the topic, conclusions can be formed. Further research will derive from phone calls to United States Space Command (and potentially subordinate units), the Office of the Secretary of Defense, Command, Control, Communications, and Intelligence, the Air Force Doctrine Center, and Air University. Once the resources have been identified to answer the secondary questions, the information will be assembled to write the thesis.

The sources will provide the basis for proving or disproving the thesis. The thesis will examine the research questions by looking at their impacts to the United States

economic, diplomatic, informational, and military instruments of national power. The thesis question can be examined from many directions. The thesis will compare the impacts on the instruments of national power: diplomatic, information, military and economic of three options. First is doing nothing. Currently the United States is performing limited research and development in many space weapons and enabling technologies. This option would mean discontinuing current research and development efforts. Second is status quo: continue research and development, but not develop and deploy a system. The outcome of options 1 and 2 could change significantly with the addition of a treaty banning space-based weapons. This could be key to viability of option 1 or 2. Third is to develop and deploy a space-based system. This third category will be broken out further to examine aggressive (offensive) and conservative (defensive) strategies. The impacts of the system will depend whether it is an offensive or defensive weapon in space. This could be an offensive counterspace system or a defensive counterspace system or could even be used to apply combat power in a terrestrial sense. For the purposes of this thesis, space weapons are divided into two categories, offensive space weapons and defensive space weapons. Offensive space weapons include terrestrial force application from space and space force application. Space force application can be destroying an adversary's satellite or reentry vehicle. What U.S. national strategy refers to as securing access to outer space fits into the conservative category. The offensive means probably goes outside of what current U.S. national strategy calls for. After examining the options, the thesis will compare the results and show whether the United States is advantaged or disadvantaged by the deployment of weapons in space.

The matrix in table 1 will be used to evaluate the options.

Table 1. Evaluation Matrix
Options Versus Instruments of Power

	1 Do Nothing	1A w/ Limiting Treaty	2 Continue R & D	2A w/ Limiting Treaty	3 Deploy Defensive Weapons	3A Deploy Offensive Weapons
Diplomatic - Ally	Pos/Neg/ Neutral					
Diplomatic - Neutral	Pos/Neg/ Neutral					
Diplomatic Potential Adversary	Pos/Neg/ Neutral					
Informational	Pos/Neg/ Neutral					
Military	-Neg -Neutral -Low - Medium -High					
Economic	Pos/Neg/ Neutral					

Of the diplomatic impacts, the ally will be weighted greater than the potential adversary, both will be weighted greater than neutral. The United States' collective security partner's interests are more important to U.S. national strategy than the interests of a potential adversary. This weighting could be in error if destabilization results and if both allies are threatened. These values are listed. Diplomatic will be the greatest weight of the instruments of power; it drives most of the major policy decisions. Informational will be weighted the least. Military will be weighted equally with the economic instrument of power.

Diplomatic Factor = 3

Diplomatic/Ally = 3
Diplomatic/Adversary=2
Diplomatic/Neutral = 1
Military and Economic Factors = 2
Informational Factor = 1

Additionally, each result will be weighted based on the following list:

Pos = 1
Neg = -1
Neutral = 0

Hi = 1.0
Med = .75
Low = .5
Neutral = 0
Neg = -1

The overall formula:

Diplomatic ((Ally*Factor)+(Pot Adver*Factor)+(Neutral*Factor)) + (Informational *
Factor) + (Military*Factor) + (Economic*Factor)

An overall positive number indicates opening up space as a theater of operations would be better than not.

To evaluate the impacts of the decision on the diplomatic instrument of power, the nations of Canada (ally), Jordan (neutral), and Russia (potential adversary) have been chosen. Canada was chosen because they are the United States' closest national ally. Canada already participates with the United States in the joint defense of the North American continent through the North American Aerospace Defense Command (NORAD). Jordan was chosen because they are neither a heavy proponent nor adversary of the United States. They stand to gain nothing from the United States' development of a

space weapons capability and have little reason to oppose it. It will not enhance or detract from their current security as a nation.

The most difficult choice is the potential adversary. The thesis could examine Russia or China as the largest threat to the United States space program and its efforts. The greatest chance for future conflict and employment of weapons with a space power is China because of Taiwan and North Korea. However, they are farther away from being a robust threat in space than Russia. Russia has the most strategic and national honor to lose by again being eclipsed by military capabilities of the United States in space. Russia is the only nation with a known ASAT capability and indisputably the most technologically advanced of the United States' potential adversaries. These thoughts are backed up in the Secretary of Defense's 2000 report to Congress: "The United States faces no global rival today, nor will it likely face one through at least 2015, however there is the possibility that a regional great power or global peer competitor could emerge. China and Russia appear to have the most potential to be such competitors" (Cohen 2000, 2).

CHAPTER 4

ANALYSIS

Background

From the very beginning of the United States' space program, General Thomas D. White, Air Force Chief of Staff in 1955, clearly saw the need to control space.

The United States must win and maintain the capability to control space in order to assure the progress and pre-eminence of the free nations. If liberty and freedom are to remain in the world, the United States and its allies must be in the position to control space. (United States Space Command 1998)

The United States' *National Space Policy* decrees, "Access to and use of space is central for preserving peace and protecting U.S. national security as well as civil and commercial interests" (Clinton 1996). Space is vital to the nation and the nation's security. The military has relied on space for *passive* military purposes almost forty years. The uses of satellites for missile warning, reconnaissance and surveillance "have generally been accepted as legitimate uses of space" (Luongo and Wander 1989, 1). These functions are used for force enhancement purposes but are not used for "force application"--directly applying force on the battlefield. Passive satellites have "important stabilizing effects" and "analysts generally conclude that they make a valuable contribution to maintaining the peace" (Luongo and Wander 1989, 1). Satellites for force application and weapons in space may be destabilizing or degrade the peace.

The first weapons in space were ASAT weapons deployed during the Cold War era to counter reciprocal threats perceived by the U.S. and U.S.S.R. The threats stemmed from both countries' ability to place weapons in orbit above the Earth and to strike the other nation without warning. The U.S. had an active direct-ascent nuclear ASAT

program until 1975 to protect against the Soviet's Fractional Orbital Bombardment System (FOBS), the main perceived threat (Stares 1985, 100). The Soviets had similar fears and developed an orbiting "shotgun-like" kinetic weapon in response to similar inferred threats from the United States. The Russian Federation has not tested their residual kinetic ASAT weapon capability since 1982 (Luongo and Wander 1989, 3). The SALT II Treaty later banned weapons systems like FOBS that led to deployment of the early ASAT systems, and further efforts to pursue ASAT systems were abandoned for the most part by the U.S. and U.S.S.R. (Luongo and Wander 1989, 2).

Open press evidence does not exist to identify on-going Russian or any other nation-state's space weapons program. The U.S.'s recent efforts include the Army's kinetic energy (KE) ASAT program and the Space-Based Laser Readiness Demonstrator (SBLRD) (Sietzen 2000). In the Office of the Secretary of Defense's *2001 Department of Defense Space Technology Guide*, force application in space is recognized as an important step. "Space-based forces would add capabilities for deterrence and flexible response when time is absolutely critical, when risks associated with other options are too high, or when no other course of action is practical" (Office of the Secretary of Defense 2001, 11-1). The *National Space Policy* requires the DoD to "operate and maintain space control capabilities to ensure freedom of action in space" (Clinton 1996). John Pike, Director of GlobalSecurity.org, said, "U.S. satellites present an attractive target to terrorists, and the United States needs to do more to protect them" (Singer 2001, 1). Protection does not necessarily mean deploying weapons in space. Today, two general schools of thought exist in the space weapons debate: sanctuary and weaponization. The sanctuary camp argues that space should remain free of weapons because it is in the best

interest of the United States and the world. The weaponization camp feels the U.S. dependence on space is too great to leave space assets unprotected. Weaponization is especially important because of the large dependence of the U.S. military on space for force enhancement purposes. This chapter analyzes the impact of deploying weapons in space from the view of the United States' instruments of national power: diplomatic, information, military, and economic.

Space Weapons and the Diplomatic Instrument of Power

Potential Adversary Impacts

Russia, because of its space technological prowess and experience with weapons in space, is the U.S.'s largest threat in space for the next fifteen years. The Russians have tested ASAT weapons and continued to advance their space technology. Additionally, they have been taking continued diplomatic measures to limit the U.S. programs. The Russians have proposed banning offensive space weapons since the 1980s (Luongo and Wander 1989, 246). Their proposals included all types of antisatellite weapons and even "space-to-earth weapons capable of destroying targets on the ground, in the ocean, and in the air" (U.S.S.R. Institute for World Economy and International Relations 1987, 246). The purpose of these proposals seems twofold: the outward appearance of wanting to limit weapons and prevent a space weapons race, but also to limit U.S. progress in the space weapons arena. The Soviets explained in 1987 the early treaty efforts were aimed at trying to maintain peace. The U.S.S.R. Institute for World Economy and International Relations in 1987 reported ASAT weapons will "gravely upset the stability of the strategic situation" (U.S.S.R. Institute for World Economy and International Relations 1987, 256). The institute's report recognized, even in 1987, the reliance of the U.S. and

U.S.S.R. strategic balance on communications, warning, and reconnaissance satellites. “Future generations of anti-satellite weapons, if capable of unexpectedly, quickly, and simultaneously disabling the main satellites of the other side, will disorganize its command and control system and at the same time heighten the threat of disarming nuclear attack against its strategic weapons” (U.S.S.R. Institute for World Economy and International Relations 1987, 256). Despite the potential destabilizing influence, both Russia and the United States continue to do research.

The U.S. research in the same period was the threat the Russians were attempting to counter with their capabilities. Paul Stares, a prominent U.S. space theorist in “The Threat to Space Systems” covered technological areas where the United States could potentially be exploring ASAT technologies. This article was written in the late 1980s and the Department of Defense is still exploring most of these routes. Here are some of the possibilities: ABM systems and ICBMs as residual capabilities, electronic counter measures (ground, ship, air, and space), and laser facilities, like the mid -infrared chemical laser (MIRACL) at the White Sands Missile Range in New Mexico. The MIRACL laser, at 2.2 megawatts, has potential if the technology could be deployed to space. The MIRACL was also successful in blinding a spacecraft in an ASAT mode test (Stares 1987, 60-61). This was status as of 1987: the United States expects to field its first prototype airborne laser in 2003, followed up by the space-based laser demonstrator as early as 2013 (Boeing Company, 2001 and Office of the Secretary of Defense 2001, 10-3).

In the meantime, while U.S. capability has been increasing, it is difficult to judge Russia’s current capabilities. Russian space launch infrastructure is in major disrepair.

Their permanent manned presence in space has ended, their Buran space shuttle rusts in a dilapidated facility, and their MIR space station will deorbit in the spring of 2001. It is difficult to predict if enough emphasis remains on strategic defense in Russia to use what little hard currency they have on developing an ASAT system.

Despite economic difficulties, the Russians have developed new generations of strategic missiles, space launchers, and upper stages. If Russians have continued to develop ASAT weapons technology, then space weapons on part of the U.S. are not a unilateral action and will not cause a strategic destabilization or a space race. Continuous use of Progress resupply vehicles with the MIR and international space stations should cause concern to military thinkers. Progress resupply vessels routinely deliver fuel and supplies remotely to the MIR space station. Docking technology is directly applicable to the closing maneuver required to engage a satellite to destroy it with an ASAT. Russian rendezvous technology has not slowed. It has become routine.

Russian weapons would not necessarily be limited to space-based weapons. Russia potentially has tested ground-based weapons that have applications as ASAT weapons. The iodine laser complex at Shary Shagan is one such system. The complex has conducted at least thirty tests against reentry vehicles by early 1981 (Peebles 1983, 168). The status of the facility is unknown. Even in the face of economic downturn and turmoil, the Russians could be maintaining many former Cold War capabilities.

Mr. Karl Grossman, covenor of the Global Network Against Weapons and Nuclear Power in Space, feels the Russian threat should not be ignored. "Russia may not have the rubles now, but it is a nation rich in natural resources and with enormous space abilities. A huge, potentially catastrophic miscalculation is being made, heading the

world to the heavens” (Grossman 2001). Mr. Grossman believes the United States is underestimating Russia’s ability to keep pace with U.S. technology. Stealth technology is a good gauge of Mr. Grossman’s argument is not totally right. The U.S. has been operating stealth aircraft for fifteen years or more. The Russians do not possess an operational stealth capability. Despite the threat of stealth, Russia continues to deploy only traditional strike aircraft. If the U.S. is underestimating Russian technology, the fact is not evident.

The main Russian reason for opposing space weapons could be one of many. Lakoff and Willoughby, in *Strategic Defense and the Western Alliance*, list four plausible reasons why the Russians would be against U.S. deployment of space weapons:

1. Leadership is currently satisfied with the strategic balance. A new space race would be very expensive.

2. The Russians are concerned with America’s technological superiority. They cannot compete head to head with U.S. advantages in electronics and sensing technologies.

3. The Russians are concerned with the potential for reduced crisis stability that destabilizing space weapons would cause.

4. Russian analysts are concerned about by-products from new exotic weapons that could render many of the Russian’s other military weapons obsolete (Lakoff and Willoughby 1987, 197-198).

Current U.S. policy is changing with respect to Russia. The U.S. Secretary of Defense the Honorable Donald Rumsfeld has recently spoken about the ABM Treaty, which has some implications for space weapons. “Mr. Rumsfeld has already called the

ABM Treaty, which Russia considers the cornerstone of all subsequent arms treaties, 'ancient history'. He has also noted acidly that it was signed by the Soviet Union, which no longer exists" (Whitell 2001). Secretary Rumsfeld and Secretary of State Colin Powell are resolutely asserting U.S. global interests based on success in the Cold War. They have made it clear the United States will continue with ballistic missile defense with or without Russia's permission (Tyler 2001). Russia's response could be predicted. Instead of using one of the true reasons for their concerns, they replied with rhetoric. Igor Ivanoff, Russian Foreign Minister said, "We had three mighty programs to counteract asymmetrically the national missile defense systems of the United States during the period of Reagan's Star Wars. He told the Interfax news agency that 'a lot of money was invested in those programs' before they were abandoned at the end of the Cold War. 'But we still have them,' he added, 'and can take them up again'"(Tyler 2001). These harsh statements are in stark contrast to Russian Federation representation at the United Nations (U.N.). Recently at the U.N. Conference on Disarmament, the Russians affirmed their commitment to keeping space free of weapons.

The Russian Federation believed that a speedy development of an international legal regime prohibiting deployment in outer space of weapons other than weapons of mass destruction, and first and foremost the striking ones, should become one of the principal tasks of the international community. It should include a mandate to elaborate and conclude an arrangement on the prohibition of testing, deployment and use of weapons and weapons systems as well as their components in outer space to prevent weaponization of outer space. (U.N. Information Service 2000)

The limitation of military development via treaty is Russia's traditional tactic. Russia has used the same argument throughout their history to try to keep pace with the United States technological prowess.

The United States lead in advanced space technologies is great and growing, and Moscow and Beijing are trying to level the playing field through arms control. But nothing is new. Soviet rulers Leonid Brezhnev, Yuri Andropov, and Konstantin Chernenko all conducted campaigns to ban weapons in space. (Hackett 2000)

Russian President Vladimir Putin was recently interviewed by Space.com and presented interesting insights into the Russian space program. President Putin gave no indication the Russians would be increasing space spending in the near term.

“It would not be an exaggeration to say that world stability is based on space activities today,” he said. “It would be an inexcusable thoughtlessness to waste the resources accumulated by previous generations [in the field of space exploration],” said the president. “Unfortunately, this is where we are going now,” he admitted, noting that only 40 percent of the space federal program for 1996-2000, has been carried out. “Neither the military nor civil sector has anything distinguished,” said Putin. (Karash 2001)

From President Putin’s remarks it can be inferred that the Russian space program is not receiving the resources it needs to remain fully viable. Russia is still a fairly closed society, so this fact is not readily verifiable in open press reporting. The Russians, with existing technology and expertise, can rapidly reconstitute their space weapons programs if they have shelved them as they try to make everyone believe. The United States development of space weapons will put pressure on Russia to take their weapons off the shelf.

Leaders of powerful states do not easily stand by and watch their adversaries gain a strategic military advantage over them. The 1962 Cuban Missile crisis was an indication of the severe reaction of a superpower. The Israeli attack on Iraq’s nuclear reactor facility in Osirak on June 7, 1981 is a recent example of a state willing to attack preemptively a facility that could produce a decisive shift in the balance of power. (Payne 1983, 4)

Deploying weapons in space would provoke Russia into action. Clearly, measures would be taken to asymmetrically deal with a new threat posed by U.S. space weapons or

parallel development would commence, as resources became available. Russia foreign policy would condemn U.S. actions as destabilizing and would again push for an agreement to limit actions in space to peaceful purposes. The potential adversary point of view could steer the United States away from deployment of space weapons in the near term unless the U.S. took measures to mitigate Russian concerns. Mitigation measures could include sharing data, verification measures, sharing protection of space resources or a combination. The next focus is the reaction of a strong U.S. ally.

Ally

The United States Space Command *Long Range Plan* recommends the United States seek partnerships to “share both costs and risks.” “International relationships may present unique opportunities to leverage space capabilities and enhance coalition warfare.” The Command sees rewards in closer relationships with Canada and Russia, such as sharing space surveillance data (United States Space Command 1998). Canada and the United States initially signed the North American Aerospace Defense Command agreement in 1958. “NORAD is a bi-national command that is responsible for safeguarding the sovereignty of Canadian and U.S. airspace” (Guimond 1998). Dr. David A. Charters, Director of the Canadian Centre for Conflict Studies, University of New Brunswick, provides powerful reasons why Canada is a close ally with the United States and why their stance on major defense issues in the United States should not be taken lightly:

In the defence field, drawing upon a long tradition of defence cooperation, the U.S. is Canada's most important ally. The two countries share more than 80 treaty-level defence agreements, such as the North American Aerospace Defence (NORAD) agreement, some 150 bilateral fora (the Permanent Joint Board on Defence dates to 1940), and 250 Memorandums of Understanding (MOUs)

between the Department of National Defence (DND) and the U.S. Department of Defense (DoD). This close relationship, albeit asymmetrical, gives Canada an unique position with respect to American military affairs: a voice in critical areas of U.S. defence policy; a respected seat at the table in international bodies, such as the United Nations (U.N.) and the North Atlantic Treaty Organization (NATO); unmatched opportunities for combined training and operations; privileged access to significant defence-related intelligence and information (85% of Canadian foreign intelligence from allies comes from the U.S.); cost-effective defence of continental approaches and airspace; and privileged access to the U.S. defence market (Canada exported defence-related goods and services worth \$ 1 billion to the U.S. in 1999). Maintained throughout and since the Cold War, Canada's unique status has been envied by Canada's other allies. (Charters 2000)

Forty-two years of extensive defense cooperation could be lost if the U.S. unilaterally decides to deploy offensive space weapons without changing Canada's official government position.

U.S. security is dependent on collective security agreements with NATO and strong allies like Canada. It is doubtful the U.S. would deploy a weapons system in space that does not benefit the collective security for U.S. strategic partners as well. Canada's view of weapons in space can be viewed through their opinions on the U.S. National Missile Defense (NMD). Professor Charters, Director of the Canadian Centre for Conflict Studies, reveals, "The greatest worry for the Canadian government is that the U.S., in order to deploy its new missile defences, will abrogate the 1972 Anti-Ballistic Missile (ABM) Treaty, which has been fervently supported by successive Canadian governments" (Charters 2000).

Bhupendra Jasani in *Space Weapons and International Security* reports Canada explicitly declined to participate in the U.S. SDI program in 1985 (Jasani 1987, 48). Another author claims Canada's main problem with SDI (NMD now) is its inherent offensive nature. "Although Canada has shown an interest in ballistic missile defense

(BMD) development, she has decided to remain on the periphery due to risk of being associated with offensive weapon systems” (Guimond 1998). James Fergusson in the *Canadian Military Journal* uses Canada’s past policy to view its future:

Canadian policy opposition to the weaponization of outer space has been politically viable under the deterrence conditions of the Cold War. Opposition was cost-free, as neither the U.S. nor Soviet Union possessed the strategic need, or technological capability, to weaponize. In the future, the strategic need and technological capability will likely exist, especially if space does emerge as the centre of military and commercial gravity for the U.S. and the West. Canadian opposition in this situation will not be politically cost-free, relative to the way in which Canada managed its defence interests, with its arms control and disarmament emphasis under deterrence. (Fergusson 2000)

From the Canadian view, if they choose not to participate in U.S. space weapons programs, their refusal may have different impacts than it did during the Cold War.

Canadians strongly believe the ABM Treaty was and still is the key to the world’s strategic balance. The new strategic environment has not yet changed Canada’s stance.

United Nations Secretary-General Kofi Annan declared at the opening last year of the U.N. Conference on Disarmament in Geneva, Switzerland, that space must be maintained as a “weapons-free environment” (Grossman 2000). The Canadian delegation did not disagree with Kofi Annan’s position. Professor Karl Grossman has analyzed Canada’s policy:

Canada’s delegation to the U.N. Conference on Disarmament has been a world leader in pressing the issue: in seeking to preserve the intent of the Outer Space Treaty of 1967, the basic international law--signed by 91 countries including the United States--setting aside space for peaceful purposes. As Marc Vidricaire of the Canadian delegation to the U.N. noted last October in a U.N. presentation: “For some time now the Conference on Disarmament [CD] has had before it the idea of negotiating the ban of the weaponization of outer space. In January 1997, Canada first formally proposed the negotiation in the CD of a legally-binding instrument for that purpose.” (Grossman 2000)

The peaceful uses provision is same provision mention earlier the Russian Federation has also tried to pass on numerous occasions. The peaceful uses provision is brought up by the Conference on Disarmament frequently. According to Professor Grossman:

Because of the U.S. military's plans for space, a vote was called this past November 1 in the United Nations General Assembly to reaffirm the Outer Space Treaty and, specifically, its provision that space shall be set aside for peaceful purposes. Some 138 nations--including Canada--voted for the motion titled: "Prevention of an Arms Race in Outer Space." The United States and Israel abstained. (Grossman 2000)

Professor Grossman's reports on the Canadian diplomatic position on space weapons differ from positions purported by the Canadian military.

A recently released Canadian military report stated Canada's communication satellites were vulnerable to attack and must be protected (Pugliese 2000, 1). "Given the fact that Canada only has 15 satellites, the destruction of even one would have serious political and financial consequences, not only for the Department of National Defence, but for the country as a whole, the report said" (Pugliese 2000, 1). The Canadians are looking at ways to make their satellites as well as the associated ground systems less vulnerable to disruption or attack (Pugliese 2000, 1). One Canadian official confided "Any action against Canadian space assets would almost certainly be tied into an attack on U.S. military systems, since the Canadian Forces is closely allied with its American counterpart" (Pugliese 2000, 1). Nevertheless, many in Canada's government resist getting involved with U.S. weapons technology. Canadians fear their policy will be subordinated by their participation with the U.S. "Limited, selective space investments into the American space envelope largely dictate that Canada will have no choice but to accept the outcome of the U.S. policy debate on space control" (Fergusson 2000). U.S.

space control policy does not require the deployment of offensive or defensive weapons in space. U.S. space control policy does envision the future use of space-based weapons.

The United States Space Command knows it will have to build strong coalition support for space weapons in the U.S. and abroad with U.S. allies before space weapons could be deployed. Treaty modifications to support space weapons, especially for force application, will especially need coalition support. The United States Space Command believes the gains to “collective security by strongly deterring rogue states” will win the requisite support (United States Space Command 1998).

Canada was a limited partner of the United States from the years 1985 and 1989 conducting research for the Strategic Defense Initiative Organization despite their national opposition. The Canadian contracts totaled \$3.48 million and included research into “power system materials, particle accelerators, platforms and theater defense architecture” (Strategic Defense Initiative Organization 1990, B-3). Perhaps with economic enticements, the United States can bring Canada on board.

Still, Canadians oppose space weapons, especially those that will be required for NMD. Major Brian Guimond of the Royal Canadian Armed Forces summarizes Canada’s position on space weapons concisely: “If the United States decides to field systems that are in violation of the ABM Treaty, Canada would be very reluctant to have a hand in a potentially destabilizing situation” (Guimond 1998).

Neutral

Researching a neutral power led to an early conclusion. It is difficult to address the issues a neutral might have. The thesis author extensively researched the Hashemite Kingdom of Jordan, the chosen neutral, and there is not information in open sources that

annotates a space policy or any stance on their strategic balance via space systems and weapons. Jordan as a nation has approximately five satellite terminals and no indigenous space assets, and probably has no major interest in what the United States does in space (Central Intelligence Agency 2001). The general discussion that follows of U.S. policy concerning weapons and space will cover issues applying to most of the world's nations.

General Impacts of Space Weapons on the Diplomatic Instrument

Reasons exist for every space-faring nation to care about the threat to their space systems. According to United States Space Command in 1998, "The long-known advantages of space have, until now, been exploited only by those governments with the requisite treasure, know-how and commitment. Today, however, 1100 companies in 53 different countries are developing, manufacturing and operating space systems" (United States Space Command 1998). Space Command expects the United States' dependence on space in the twenty-first century will be greater than its dependence on oil and electricity in the nineteenth and twentieth centuries (United States Space Command 1998). The Commission to Assess United States National Security Space Management and Organization (hereafter referred to as the Space Commission) recently summarized the United States policy:

U.S. activity in space, both governmental and commercial, is governed by treaties and by international and domestic law and regulations, which have contributed to the orderly use of space by all nations. As interest in and use of space increases, both within the United States and around the world, the U.S. must participate actively in shaping the space legal and regulatory environment. To protect the country's interests, the U.S. must promote the peaceful use of space, monitor activities of regulatory bodies, and protect the rights of nations to defend their interests in and from space. The U.S. and most other nations interpret "peaceful" to mean "non-aggressive"; this comports with customary international law allowing for routine military activities in outer space, as it does on the high seas and in international airspace. There is no blanket prohibition in international law

on placing or using weapons in space, applying force from space to earth or conducting military operations in and through space. (Commission to Assess United States National Security Space Management and Organization 2001, 27)

To “shape” the international environment there are many ways to bring reluctant nations on board. Objectives of a combined space defense program could be similar to those established for national missile defense or space weapons that could contribute to NMD. The goals and benefits are listed in the 2000 DoD Report to Congress. The same benefits could be made for defensive space systems by substituting “space” for “missile”:

1. To Provide effective missile defense for U.S., allied, and friendly troops, and for allied and friendly civilian populations
2. To strengthen U.S. security relationships
3. To enhance collective deterrence of missile attacks
4. To share the burden of developing and fielding missile defenses
5. To enhance interoperability between U.S. forces and those of allies and friends

(Cohen 2000, 76)

Space control has gained importance as a new mission area for the United States and could eventually employ space weapons as part of the program. The United States space control strategy includes “activities to enhance the surveillance, protection, prevention, and negation missions as well as to unite space control research and development programs” (Cohen 2000, 84). The report further explains that DoD “must have the appropriate capabilities to deny when necessary an adversary’s use of space systems to support hostile military forces” (Cohen 2000, 97). Denial of adversary’s space systems could imply space weapons.

Will weapons in space stabilize or destabilize national security and the world balance of power? Russian and Canadian arguments presented earlier most closely align with those that believe in space as sanctuary, a place that provides safety. James Ferguson, writing for the *Canadian Armed Forces Journal*, offered one counterargument:

Space is not a sanctuary and since the beginnings of the space age has never been one. It may be illegal to deploy and test nuclear weapons in space, but it is not illegal to use them in space. Thinking that 'criminalizing' the deployment of weapons in space resolves the problem, in actuality may undermine Western security. It permits all states to practice space denial, but no states to practice space defence outside of passive measures and limited dual-purpose missile defence. Strategically, it makes no sense, except as a function of deterrence which has framed the entire strategic debate, including arms control and disarmament. (Fergusson 2000)

James Ferguson offered a viable argument why space as a sanctuary could be dangerous for world stability. Outlawing space weapons makes it illegal to protect your sovereignty. (Fergusson 2000) Bhupendra Jasani offers a different opinion in his book titled *Space Weapons and International Security*:

In today's world, with so many nuclear weapons, which depend considerably on satellites for their efficient use, any damage caused to the latter might mean a declaration of hostility between the two major powers, thus endangering international security. (Jasani 1987, 5)

This sentiment was echoed by Walter McDougal in the *Heavens and the Earth* for another reason: "Early in the space years, weapons capable of destroying satellites or missiles in flight might contribute to a first-strike capability and thus were judged destabilizing" (McDougal 1997, 337). Roles of satellite for communication, navigation, weather, intelligence, surveillance, reconnaissance, and other force enhancement missions make them juicy targets, like an Airborne Warning and Control System (AWACS) or aircraft carrier. A satellite accident or malfunction could be perceived as an

act of war. Rapid escalation from a misperception could result with unintended consequences (Jasani 1987, 55). Weapons in space would require increased communications between space-faring nations to ensure space engagements did not spiral into a much broader conflict. Intentions of hostile acts must be clearly understood, especially if attacking passive systems. Walter McDougal makes an excellent point about weapons in space: “Passive military satellites are stabilizing. To throw away their tacit safety in order to play with unproven, destabilizing and expensive weapons seemed foolish” (McDougal 1997, 339). McDougal related how President Eisenhower adopted sanctuary as U.S. policy in early 1960s. He credits Eisenhower’s sanctuary policy with the strategic stability that has existed to this point in space. The presidents that followed maintained space for peace. “The American decisions of 1963 did seem to preserve outer space as a sanctuary well into the 1980’s” (McDougal 1997, 343). Sanctuary has kept space free of conflict until the present. Counter arguments exist that space has only remained peaceful because of technology, and there are disagreements as to how long this record will remain. The Space Commission thinks space will be a battlefield sooner rather than later:

We know from history that every medium--air, land and sea--has seen conflict. Reality indicates that space will be no different. Given this virtual certainty, the U.S. must develop the means both to deter and to defend against hostile acts in and from space. This will require superior space capabilities. (Commission to Assess United States National Security Space Management 2001, 20)

“Superior space capabilities” could solve one problem and create another.

Deploying weapons in space may lead to other countries deploying weapons in space to counter U.S. weapons and so on and so on. As mentioned earlier, a space race with Russia and most likely China as well, is not in the U.S. or its Allies best interests. The

potential negative impacts to the diplomatic instrument of national power may push the United States not to deploy weapons in space.

The ABM and Test Ban Treaties can be voided or negotiated, but very real technology cost concerns make that option difficult to justify. The probable outcome must justify the international political damage likely to accrue from such unilateral action. That assurance does not exist yet. (Handberg 2000, 182)

Roger Handberg's conclusion echoes that of many others. The military benefits must outweigh the political costs for space weapons to have a positive impact on the diplomatic instrument of power. The thesis will now examine impacts to the information instrument.

Space Weapons and the Information Instrument of Power

The United States and Western powers' reliance on space will not be lost on potential enemies. Attacking vulnerable terrestrial assets will provide enemies an information advantage. The vulnerability of space systems actually may weaken the information instrument of power, causing nations not to fully take advantage of space capabilities. The Space Commission warns of U.S. vulnerabilities:

History is replete with instances in which warning signs were ignored and change resisted until an external, "improbable" event forced resistant bureaucracies to take action. The question is whether the U.S. will be wise enough to act responsibly and soon enough to reduce U.S. space vulnerability. Or whether, as in the past, a disabling attack against the country and its people--a "Space Pearl Harbor"--will be the only event able to galvanize the nation and cause the U.S. Government to act. We are on notice, but we have not noticed. (Commission to Assess United States National Security Space Management and Organization 2001, 25)

The Space Commission obviously thinks U.S. space assets are vulnerable and the U.S. needs to act to remedy the current situation. Space contributions to national defense are weakened because space assets are not properly protected. This fact is true whether

viewing ground segment vulnerability or spacecraft vulnerability to simple negation measures. To strengthen the impact of space to the informational instrument of power, it is important to portray them as a robust capability. Assailable capabilities need to have a measure of protection. Besides being a credible threat or capability, to be a positive information instrument, the capability also needs to be lawful to be effective.

Lawrence Greenberg in *Information Warfare and International Law* highlights some potential difficulties with the legal aspect of deploying weapons in space. Similar to the destabilizing aspect under the diplomatic instrument, determining if you have been under attack can be difficult. When the attack occurs during a time of international conflict, investigators will have to determine if it was a natural occurrence or result of aggression. It is a violation of the laws of armed conflict to react unprovoked (Greenberg 1998, 52).

For a response to attack to be lawful, it must be shown as an act of aggression by a foreign nation. Aggressive acts are covered under Article 51 of the U.N. charter. “The only lawful use of force, besides collective action to enforce peace under U.N. auspices, is in individual or collective self-defense against ‘armed attack’” (Greenberg 1998, 83). Proving a system failure or disruption was caused by a belligerent is technically challenging. Proving the incident to be an “armed” attack is even more difficult. Very few satellite systems, especially commercial spacecraft, have impact sensors, let alone intrusion alarms or radio frequency interference (RFI) detectors. The difficulty of proving the attack is compounded when the U.S. is part of a coalition, and foreign governments must be convinced of an attack before responding (Greenberg 1998, 62). Proving an attack occurred may require compromising classified information. Network attacks raise

similar issues. “The principles of sovereignty were conceived when international law contemplated only physical intrusions into a nation’s borders, national governments would probably try to apply the principles to intrusions into, networks or data banks and they would probably succeed” (Greenberg 1998, 65). This leads to the logical conclusion of space assets as well. However, “orbital remote sensing, including the bouncing of such signals as radar off a country’s territory is now so universally accepted that it is conducted by private entities” (Greenberg 1998, 66). Radar signals do not count as intrusion, but RFI does. Fine lines exist when trying to apply international law to space. The ideas above shed light on the difficulty of maintaining the moral and legal high ground when reacting to incidents in space. Inherent impediments to the information instrument of power exist merely to deploying weapons in space, let alone using them there.

Deploying weapons in space makes the United States look aggressive. The U.S. has spent the end of the cold war turning many swords into plowshares and has maintained space for peaceful uses as part of the national space policy since 1963. According to the *National Space Policy*, “The United States is committed to the exploration and use of outer space by all nations for peaceful purposes and for the benefit of all humanity” (Clinton 1996). However, “It must be recognized that there are no legal measures at present that would prevent the development, testing, and possibly even deployment of ASAT weapons” (Jasani 1987, 43). The thought of weapons in space will negatively affect the U.S. information instrument of national power. “If we weaponize space, we will face a very different image--the image of hundreds of weapons-laden satellites orbiting directly over our homes and our families twenty-four hours a day, ready

to fire within seconds. If fired, they would destroy thousands of ground targets within minutes, before there is even a chance of knowing what has happened and why” (Robb 1999, 81). The launch of Sputnik put an irrational fear on the United States population. All it did was beep. Careful education of the U.S. population and its allies to the threat to their economy and livelihood will have to be done before it is widely accepted in a positive light.

In 1982, the neutron bomb was a source of controversy. The neutron bomb was a destabilizing weapon, but some felt it was required to counter the massive Warsaw Pact armor threat. According to Robert C. Aldridge in the article “Precision Guided Weapons and the Neutron Bomb,” “We think [it] enormously increases our deterrent, our ability to demonstrate to the Soviets . . . that we have the capability to respond, and to inflict a cost which we hope they would regard as unacceptably high” (Aldridge 1982). The population and world opinion judged the cost unsupportably high. Although the effects of the bomb limited collateral damage to the indigenous population, it would have greatly increased the threat of all-out nuclear war. The weapon was cancelled because of the negative impact to the U.S. information instrument of power (not a weapon of peace, simply to further U.S. imperialism according to world opinion), the threat of escalation in the nuclear arms race, and the inherent destabilizing nature of the weapon (Aldridge 1982). Many authors cite the clear advantage the Russians have the edge in the information instrument of power:

The Soviet Union almost from its inception successfully used diplomatic measures to secure its objectives against the West. Application of this instrument is clearly asymmetrical between western democratic powers and those of the East. (Almond 1984, 230)

The same theories the Soviets used in the negative information campaign against the neutron bomb were used again with the strategic defense initiative. They were:

1. SDI complicates arms control agreements.
2. SDI weapons are strategically destabilizing.
3. SDI weapons are designed to enable the U.S. to further its own interests (Strode 1983, 146).

These same informational techniques are being used today by Russia, China, and others to counter U.S. plans to deploy weapons in space. Charles Robb offers similar rationale not to build space weapons. The first is “Americans would, in relative sense, lose the most from a space-based arms race. An arms race would make our space systems more vulnerable than they are today.” That argument is difficult to counter. Space weapons are not under threat today because no one has space weapons. Space-faring nations would not likely stand idly by and watch the U.S. spend billions to develop space weapons without acting. Especially when the deployment places their country at even greater disadvantage (Robb 1999, 81).

A second reason Mr. Robb uses is: “A space-based arms race would be essentially irreversible” (Robb 1999, 81). Russia and the U.S. have developed and deployed space weapons in the past, but only to threaten low-earth orbit spacecraft. It is unrealistic to assume high-altitude weapons would be returned to earth. The costs would be prohibitive. In addition, the option of rendering the satellite weapons useless or dismantled in space without creating a debris hazard is impractical (Robb 1999, 81). An irreversible decision with negative connotations to the U.S. information instrument is not prudent.

The third reason Mr. Robb disapproves of space weapons is: U.S. space weaponization would increase the “probability of strategic conflict” (Robb 1999, 81). A laser-type weapon is probably the most destabilizing of all. A laser weapon could rapidly destroy a large constellation of satellites with little warning. Countries would have to act with little notice to protect their space wealth. Hair-trigger responses are strategically risky to all parties involved (Robb 1999, 81). A potent first-strike capability could seriously sully the reputation of the United States, even though the U.S. has never executed a first-strike before.

A first-strike capability on top of current space superiority may also turn the U.S. information weapon against themselves. Perceived strategic inadequacies caused “space-races” in the past. Currently, strategic parity in space or terrestrial weapons capabilities does not exist. If the argument regarding perceived inadequacies were true, the Russians would be on a crash program to build better tanks and satellites now. This is clearly not the case. Given this evidence, it is difficult to believe the Russians would deploy space weapons or invest heavily in space weapon development just because the United States is. The perception of the U.S. being the lone world superpower has taken the wind out of that argument.

One positive impact of deploying space weapons on the information instrument of power is the confidence it could bring in the civilian population. A space-based system used to protect from rogue nation missile attack would be positive to the population of a nation. “The important fact to remember, however, is the stabilizing effect the Patriot system had upon the Israeli population, and the value that will be afforded by striving to

perfect countermeasure systems” (Guimond 1998). A terror weapon like a scud missile could be rendered impotent.

Another positive impact is the potential deterrent value. The weapon must be credible to be effective. Establishing a credible deterrent requires some overt U.S. policy concerning employment of space-based weapons. Like other U.S. weapons systems, adversaries need to have an idea what U.S. response would be in specific situations. The overt policy would spell out a detailed U.S. space sovereignty policy. This policy would explain to international actors how the United States would define an “attack on” or “interference with” their satellites, how this influences sovereignty and how the U.S. would respond (United States Space Command 1998). The policy would include a specific set of rules governing the areas of space system protection, negation, and force application. Rules in each mission area would permit informational “shaping” to gain international acceptance of this policy (United States Space Command 1998). Space weapons become a credible information weapon once these expectations are public knowledge. Space weapons providing a protective shield over U.S. space assets as well as those of U.S. allies could also have a positive impact on the information instrument.

Deploying space weapons unilaterally would allow the United States to dominate space. The United States would have to develop credibility that U.S. presence is “benign space dominance.” This concept is explained by Roger Handberg in his book *Seeking New World Vistas: the Militarization of Space*. “Psychologically, the U.S. defines itself as the protector of the greater good within world politics.” Dominance of space becomes “benign sovereignty” (Handberg 2000, 258). Benign space dominance refers to dominance through occupation where the U.S. maintains equal access to all nations. The

U.S. could develop a case that shows benign space dominance would be possible, as in Antarctica. Confidence is gained with the examples of the enhanced radiation weapons, also known as the neutron bomb, and chemical weapons. The United States unilaterally destroyed all of its chemical munitions and never deployed the neutron bomb because these weapons risked stability and were inhumane. These weapons gave the United States more variety of strategic response options, but their inherent qualities and lack of sound employment doctrine led to their dismantlement or program cancellation. Space weapons, if implemented in a nonthreatening way, can provide nonprovocative deterrent value. By establishing space for peace, the presence of U.S. weapons can guarantee that peace.

Some do not agree. “In effect outer space becomes an American lake into which access is normally open but subject to U.S. judgement. For that reason, the concept has largely been seen as politically unacceptable” (Handberg 2000, 203). Roger Handberg’s position is the U.S. would probably create more harm than good with benign space dominance. “The effects politically would be fairly dramatic, reversing understandings laid down in the first decade or so of the space age. In practice, free access to outer space would no longer be the rule, at least during times of war and crisis” (Handberg 2000, 205). Nations may not be convinced of the nobility of the U.S. purpose. It will be difficult to determine the reaction of U.S. politics to international concerns and criticism (Handberg 2000, 258). Stateside ramifications will also have to be taken into account. Space weapons have potentially positive effects to help win the media information war.

Space weapons have the potential to add an interesting dimension to future conflicts. An article following Air Force Space Command’s first space war exercise gave some of the benefits. Space weapons “might be able to send the same message of resolve

quietly, without attracting media, and therefore public attention” (Singer 2001, 1). The “CNNization” of recent conflict has really hurt the U.S. in terms of the information war. Miscues during the Kosovo conflict have serious policy impacts to the campaign effort. The United States still has not recovered from the political fallout of the Chinese embassy bombing.

The information instrument of national power could be positively or negatively impacted, depending how the U.S. deployed weapons in space and what employment doctrine covers the deployment. Deployment of space weapons will also influence the military instrument of power.

Space Weapons and the Military Instrument of Power

“Military force is the weapon of choice when the other instruments of international power fail to accomplish a national need” (Handberg 2000, 235).

Before discussing the military instrument of power, it is essential to explain current U.S. national policy. The U.S. *National Space Policy* lists the following items that are pertinent to the discussion of the military instrument:

1. The United States considers the space systems of any nation to be national property with the right of passage through and operation in space without interference. Purposeful interference with space systems shall be viewed as an infringement on sovereign rights.
2. National security space activities shall contribute to the U.S. national security by providing support for the United State’s inherent right of self-defense and our defense commitments to allies and friends; defending against enemy attack; assuring hostile forces can not prevent our own use of space; countering if necessary, space systems and services used for hostile purposes.
3. DoD shall maintain the capability to execute the mission areas of space support, force enhancement, space control, and force application. (Clinton 1996)

The United States Space Command, the single focal point for military space, in its *Long Range Plan* makes an important, but understated statement: “The U.S. military

must guard against having U.S. dependence on space turn into a vulnerability. Thus, protecting our freedom to use space and having an ability to deny an enemy's use of space will grow more important in the future" (United States Space Command 1998). This statement is understated because the U.S. military is dependent on space to the point of vulnerability. There would be no missile warning, impaired communications, and a severe impact to force enhancement data without space today. Lack of space-derived weather and navigation data are vulnerabilities that are even more threatening to military operations. The military is absolutely dependent on space for full spectrum dominance. The "56 satellites of various types from different nations were engaged in the Serbia operation. Disrupting, or worse, destroying those space assets poses a total threat to the efficient global perception of American power" (Handberg 2000, 191-192).

The most recent studies completed in the United States have unanimously agreed that there is a potent need to safeguard the United States' considerable national advantage in space capabilities. The United States and other space-faring nations have potential ASAT weapons. Russia and the United States have been doing high-power laser research for many years. Both countries have the capability to temporarily blind a satellite using these test weapons. Laser weapons do not take much imagination. More residual capabilities exist that simply take a small imagination. Russians are very good at automatically docking Progress resupply ships to their space stations in a low earth orbit. Russia has over thirty years experience with these docking operations. Russia has the capability to use a simple resupply vehicle to kinetically impact a satellite in a low earth orbit. A similar operation could be performed with a little engineering expertise and a spacecraft with enough remaining fuel to perform a rendezvous with a nearby satellite. A

cloud of unburned fuel could be released and ignited; ground control could maneuver the satellite in vicinity of the target, and then pressurize and explode its fuel tanks to create a debris field. The iterations are endless. The United States could perform ASAT-like rendezvous missions using the space shuttle. The shuttle method could maintain a cover of plausible deniability. There are many ways to degrade a satellite without overt weapons. Even so, it is hard to place a ban on space weapons, when many countries have capabilities that are potentially dual use.

Besides having traditional dual-use weapons, countries are working on ways to counter the dominant U.S. space presence. The U.S. intelligence community agrees there is a threat. Vice Admiral Thomas R. Wilson, director of the Defense Intelligence Agency recently gave this testimony to the U.S. Congress:

A number of countries are interested in or experimenting with a variety of technologies that could be used to develop counterspace capabilities, China and Russia have across-the-board programs under way, and other smaller states and non-state entities are pursuing more limited though potentially effective approaches. (Gertz 2001)

Admiral Wilson expects that by 2015 “future adversaries will be able to employ a wide variety of means to disrupt, degrade or defeat portions of the U.S. space support system” (Gertz 2001). The Director of the U.S. Central Intelligence Agency has very similar concerns:

“Our adversaries well understand U.S. strategic dependence on access to space,” Mr. Tenet said. “Operations to disrupt, degrade, or defeat U.S. space assets will be attractive options for those seeking to counter U.S. strategic military superiority.” (Gertz 2001)

Mr. Tenet’s view of the threat is clear. The U.S. Space Command requires proper tools to actively protect U.S. space resources.

The U.S. Space Command's *Long Range Plan* requires key capabilities for space control requiring weapons be deployed in space for effective implementation. Space control requires the effects of "deny, disrupt, deceive, degrade, and destroy" (United States Space Command 1998). In the report of the Commission to Assess United States National Security Space Management and Organization, the commission relates some interesting conclusions. One regards the threat. The case for building, testing, and deploying weapons cannot be made without adequate information on threats to U.S. space assets.

Failure to develop credible threat analyses could have serious consequences for the United States. It could leave the U.S. vulnerable to surprises in space and could result in deferred decisions on developing space-based capabilities due to the lack of a validated, well-understood threat. (Commission to Assess United States National Security Space Management and Organization 2001, xiii)

The U.S. must determine if there is a credible threat before it can politically proceed down the path of deploying space weapons. Given a valid threat, the U.S. can decide what types of effects the systems will be required to deliver.

The U.S. can make positive impacts to the military instrument of national power with the use of space-based weapons. A space-based laser for instance would be able to engage not only reentry vehicles and spacecraft, but also targets in the atmosphere above the cloud tops. Lucrative targets would include cruise missiles, aircraft, unmanned aerial vehicles (UAVs), and theater ballistic missiles (TBMs) (Luongo and Wander 1989, 165). Other military advantages to be gained by employing weapons in space include: rapid precision terrestrial engagement in minutes vice hours; denial of space-derived information: negating enemy reconnaissance, communications, early warning,

navigation, electronic order of battle, anything that space provides could be targeted with space weapons; and protection of friendly space systems.

Projected precision engagement would allow the United States to “hold at risk” a number of high payoff targets with rapid, assured force application from space (United States Space Command 1998). Any target in the world could be engaged in less than ninety minutes (United States Space Command 1998). These same advantages apply equally to the U.S. and any country that exploits them.

Potential losses to U.S. forces by space weapons are frightening. Imagine trying to fly into enemy territory not knowing where to expect surface-to-air missile sites. Gaining space superiority goes a long way towards gaining information superiority. Brigadier General Pete Worden, Vice Director of Operations for Air Force Space Command, has an appreciation for what quick strike space weapons could offer the warfighter. He was involved in a recent space exercise to get a feel for what space weapons may offer in the future:

These new space capabilities really start [presenting] an opportunity for strategic deterrence. They’re precisely controlled, non-nuclear weapons--ideal tools for that period between the beginning of a crisis and the start of full-scale hostilities. Space is bringing a lot of new options . . . for deterrence--an ability to guide and defuse a crisis early on. (Scott 2000, 55)

However, according to the authors of *Seeking Stability in Space*, “The gains for the attacking side would almost certainly be slight compared to the visible and highly provocative nature of attacks on satellites that might escalate the geographical scope of the conflict” (Perry, Scowcroft, Nye, and Shear 1987, 10). In a minor conflict, destroying a multimillion-dollar satellite could increase tensions. Perry, Scowcroft, Nye and Shear

bring up the same point brought up earlier about potential strategic destabilization caused by satellite warfare.

Suppose that each side believed the other could blind or destroy its warning and communications satellites within minutes of a decision to strike. Fearing preemption, each side might be driven to nuclear alert levels that were inherently unstable. An accidental collision of spacecraft . . . could prompt a decision to attack the other side's ASATs. (Perry, Scowcroft, Nye, and Shear 1987, 10)

The Aspen Strategy Group authors concluded, "We find it very hard to identify a set of circumstances in which the benefits of using the limited existing ASAT systems markedly outweigh the potential risks" (Perry, Scowcroft, Nye, and Shear 1987, 11).

Perry, Scowcroft, Nye, and Shear do, however, see a potential upside to ASAT weapons. "The limited covert use of laser weapons to damage the optics or electronic componentry of satellites might be plausibly deniable and hard to confirm" (Perry, Scowcroft, Nye, and Shear 1987, 11). Weapons effects that must be "denied" do not seem to have much useful deterrent value. The Aspen Strategy Group authors underscore five central points concerning ASAT weapons:

1. The satellites that contribute most to adversary warfighting capabilities are in Low Earth Orbit (LEO)
2. The threat of current weapons systems is modest but will increase with advent of real-time targeting systems
3. Residual ASAT capabilities in the U.S. and Russia are confined to LEO
4. No one possesses the capability to hit a large constellation of satellites quickly
5. Motives to attack satellites are greatest when directly engaged in conventional conflict
6. Situations involving the use of ASATs risk accident, misperceptions and unplanned intensification. (Perry, Scowcroft, Nye, and Shear 1987, 11-12)

These points are important. Currently, only LEO satellites are in danger. Space *defense* weapons should be deployed in LEO first for best deterrent value since high-altitude systems are not currently in danger. Missile warning and communications

satellites reside in these high orbits. Loss of these satellites has the highest chance of causing destabilizing escalation if attacked. Initial deployments of weapons into low-earth orbits would be less destabilizing and provide protection where needed.

Negative military value exists to deploying weapons in space as well. “Even if we develop superior space technology, unrestrained deployment of ASAT weapons may not improve our military position on earth” (Perry, Scowcroft, Nye, and Shear 1987, 2).

Reciprocal space weapons deployment by adversarial nations can negate positive impacts to the military instrument. Deploying weapons in space has other potentially positive impacts to the military instrument.

Each different threat weapon system deployed by an adversary to threaten space assets makes building space systems more complex. Complexity adds weight to the spacecraft. Weight decreases mission life and may increase launch costs. For example, a kinetic energy weapon could be defended against by doing an emergency orbit adjust. An orbit adjust requires fuel. Using the fuel to do an emergency orbit adjust takes away fuel required to do station keeping maneuvers to extend mission life. Defense against a laser weapon adds complexity as well. Laser defense may require protective filters, sensor covers, and mirrored coatings on the outside of a spacecraft. Items not required for normal spacecraft function take away from weight normally used for more fuel or additional mission capability. Impact or proximity sensors may also be used to determine if a spacecraft was under attack. Sensors are again, more added weight and subsequently, less mission capability. “Survivability adds nothing to capability in a peacetime environment” (Giffen 1984, 199). Survivability measures inherently lower capability.

ASAT weapons not only put current spacecraft at risk, but require countermeasures for future systems as well.

Measures need to be taken to safeguard space capabilities. This fact has been acknowledged since the beginning of the space program. A recent RAND study reiterated that fact:

Ensuring free access to space and passage in space as on the high seas has been a consistent objective of U.S. national security policy since the first Sputnik launch and is reflected in international agreements to which the United States is a party. (Johnson, Pace, and Gabbard 1998, 40)

However, the RAND study was not immediately concerned with protecting satellites in space: “Space-related ground targets are likely to continue to be the most vulnerable parts of space systems because of the ease of reaching them and the relative difficulty of getting to space” (Johnson, Pace, and Gabbard 1998, 41). Dropping a 2,000-pound bomb on a satellite ground station is within the technical means of many nations. Clipping a power line or destroying a satellite dish is even more attainable and can have the same effect. Nations must protect the most vulnerable segments of their space capabilities first, before worrying about deploying defenses in space.

Future envisioned threats require measures to protect space assets and the space lines of communication as well. In the book *Space: Emerging Options for National Power*, the authors make comparisons of space doctrine with sea doctrine: “Space control can be likened to many naval missions like maintaining the security of the sea lines of communication or mining harbors to prevent access or exit” (Johnson, Pace, and Gabbard 1998, 41). The AFDD 2-2, *Space Operations*, draws a comparison between air and space superiority: “Like air superiority, space superiority helps to provide the

freedom to conduct operations without interference from an adversary. Hostile powers must not be permitted to freely use space systems against U.S. national interests” (AFDD 2-2 1998, 7). To control space, gain and maintain space superiority, and protect the space lines of communication, the United States must build defensive and offensive space weapons.

Without deploying weapons in space, the U.S. is providing potential adversaries sanctuary from which to attack with impunity. Space control measures will be necessary for future operations in space.

We cannot, it is often argued, erect negotiated barriers to ASAT threats in order to protect “benign satellites” without creating a sanctuary for “threatening satellites.” On the other hand, an open-ended ASAT competition will ultimately expose our most valuable assets to direct attack. (Perry, Scowcroft, Nye, and Shear 1987, 5)

Protecting U.S. satellites will put them in danger of attack. Not protecting U.S. satellites creates a sanctuary for enemy spacecraft. Protecting U.S. satellites is a positive measure. Choosing not to defend them is not logical from a military standpoint. Ultimately, the U.S. will be so dependent on space, the arguments against deploying weapons in space will be nullified.

A deployment before the critical need to protect the U.S. could cause problems. The strategic balance could be significantly altered if the United States acts alone developing and deploying space weapons. Deploying these weapons could cause the development and deployments by Russia or China. The deployment could also lead to development of asymmetric threats by rogue nations.

To prevent strategic imbalance, the U.S. can exercise other options. One option to maintain satellite capability without space weapons is “maintaining a robust replacement

capability built around hidden spares, more expendable boosters, and a broader array of backup systems (including alternate air and ground sensors). But of course, such measures are expensive” (Perry, Scowcroft, Nye, and Shear 1987, 13). Taking measures to protect the space segment does nothing if the ground stations can be easily negated. Besides vulnerable ground stations, satellites can make U.S. forces vulnerable to hostile attack as well.

Soviet ocean reconnaissance satellites are very dangerous to U.S. Naval forces (Perry, Scowcroft, Nye, and Shear 1987, 6).

It is not a simple task to defeat RORSATs and EORSATs with electronic countermeasures (ECM) when they fly as a pair. The tactic of using radio silence (EMCON) as a counter to the EORSAT imposes penalties on fleet air --defense operations and leaves the fleet open to RORSAT radar detection. As reconnaissance systems become more real-time, to the point where they can be used to provide immediate targeting data directly from sensor to shooter to direct attacks on atmospheric targets, they will become targets that are much more lucrative. (Perry, Scowcroft, Nye and Shear 1987, 7)

An essential reason for the U.S. ASAT program is to counter threats like the EORSAT-RORSAT combo that places U.S. strategic forces at a serious disadvantage. To use an ASAT weapon in this case, the U.S. fleet would have to clearly be threatened. “The use of ASATs in peacetime is nonsensical (absent some surreptitious effort to blind a lone satellite without being caught) if one’s desire is to remain at peace” (Perry, Scowcroft, Nye, and Shear 1987, 9).

The Space Commission appreciated the sensitivity that surrounds the notion of weapons in space for offensive or defensive purposes. The commission also believes, however, that to ignore the issue would be a disservice to the nation. The recent Space Commission states the United States should aggressively seek the tools referred to in the

United States' *National Space Policy* to guarantee the national command authority will have the "option to deploy weapons in space to deter threats to and, if necessary, defend against attacks on U.S. interests" (Commission to Assess United States National Security Space Management and Organization 2001, 22). The commission does not do justice to the foreign threat to U.S. space systems but infers "they will come."

An official from the Chinese armed forces recently shared his opinion of U.S. deploying space weapons as part of the U.S. antimissile shield in an article from Agence France-Presse.

He said the political implications of the planned deployment of the system would be to contain China and Russia, "peer competitors" of the United States. Beijing has vehemently voiced its opposition to the American anti-missile plans in recent months, arguing they would lead to a new global arms race. "The consequence will be a dangerous arms race in space," said Yao Yunzhu, an official with the Chinese armed forces' academy of military science, quoted by China Daily. (Agence France-Presse 2001)

The Space Commission simply warns of a surprise attack:

As history has shown--whether at Pearl Harbor, the killing of 241 U.S. Marines in their barracks in Lebanon, or the attack on the USS Cole in Yemen—if the U.S. offers an inviting target, it may well pay the price of attack. With the growing commercial and national security use of space, U.S. assets in space and on the ground offer just such targets. The U.S. is an attractive candidate for a "Space Pearl Harbor." (Commission to Assess United States National Security Space Management and Organization 2001, xiii)

An attack on U.S. space assets, whether civil, commercial, or government, is considered an act of war. The U.S. could respond in like kind to terrestrial threats. The U.S. has no means of attacking from space. However, what if the satellite is owned by a multinational coalition? This is an area currently fraught with confusion. Multinational corporations own some satellites, so they are not really "flagged" under a single country. Is an attack on a commercial French satellite an attack on the NATO alliance? The

RAND study expresses one opinion: “The U.S. would certainly respond to a direct attack on itself or its allies” (Johnson, Pace, and Gabbard 1998, 40). The reprisal would not be performed because of a loss of a multimillion dollar satellite but to show will. “As the leaders in space power, the U.S. has an obligation to ensuring freedom of access, like it does with naval freedom of navigation challenges today” (Johnson, Pace, and Gabbard 1998, 41). The argument continues from there and becomes even more complex: “Would the United States be willing to assert rights of free passage in the face of hostile claims, as it did in the case of Libya’s claims over the Gulf of Sidra?” (Johnson, Pace and Gabbard 1998, 41). The United States would have to perform “show-of-force” operations when provoked, to maintain the strength of the military, diplomatic, and informational instruments that would be exercised in a case like this. If the United States did not react, the capabilities would be useless.

The capabilities are extremely important as space commerce expands. The U.S. not only needs to exercise space control to protect military interests, but the economic as well. Protecting space assets will be guarding the U.S. economy, which is dependent on space to function. The U.S. went to war over oil in the Persian Gulf. The U.S. will act against threats to space commerce sometime in the future.

The RAND study concluded with important points in the space weapons debate: “In the current budget, political, and threat environment, it is unlikely the U.S. will make a decision to develop space-based weapons in the near future” (Johnson, Pace, and Gabbard 1998, 44). Militarily the weapons show great promise, but are not required for current security needs. The United States is currently in a position of military strength in

space. By providing space control leadership to threatened nations, the U.S. can help provide global stability (Johnson, Pace, and Gabbard 1998, 45).

By creating a space race, the United States may threaten global security and clearly has the most to lose. The U.S. is more dependent on space as a society and as a military than any other nation. Currently U.S. satellites orbit the earth in sanctuary. Deploying weapons there violates the sanctuary and opens space as a theater of conflict. However, “The United States never wants to fight a war from a technological parity of inferiority. To do so many well shift escalation dominance to the enemy, especially if that enemy is unconstrained by public opinion” (Bell 1999, 7). The United States has recently only negotiated from a position of overwhelming combat power.

Waiting to be the second nation to deploy weapons in space also has other drawbacks.

By controlling the sea lanes and specific shipping choke points, the British navy was able to minimize unwanted interference in its affairs. The analogy is that by controlling space or by retaining the ability to control access to space, the United States creates a similar advantageous national position in space. (Handberg 2000, 192)

This position of power could just as easily be ceded to the enemy. Major Tom Blow offered a potential setback in a book researched for Airpower Research Institute titled *Defending Against a Space Blockade*. The title says it all. A robust constellation of space-based weapons would allow the owner to keep other nations from deploying civilian satellites or weapons there. Controlling entry and use of space would give the blockading country a tremendous economic and military advantage (Blow 1989). A space blockade would be difficult to employ, but it is not beyond the realm of possibility. The threat of a blockade is not too far in the future for military officers to worry about.

Before the outbreak of World War II, the United States thought its bomber force was invincible, and nothing could stop its attacks. After horrendous losses in strategic raids over Germany at Schweinfurt and Regensburg, America knew it had to develop a defensive capability to protect its bomber forces and make them an effective weapon. Doctrine currently calls for protection of the U.S. space assets. “Space protection systems could defeat antisatellites engaging our satellite or launch systems. Such systems are the P-51 escort fighters of the future, providing defensive firepower for our space force multipliers and space strike systems” (Airpower Research Institute 1997, 203). Lieutenant Colonel Thomas Bell, writing for the Air War College Center for Strategy and Technology, brought up important strengths for space force application. Space forces will allow strategic bombing and interdiction without forward-deployed forces. This has implications for basing rights and political constraints (Bell 1999,13). Despite being able to strike enemy targets without forward bases, the delivery systems still require protection.

Force projection satellites will need protection from enemy antisatellite (ASAT) systems. Whether protection occurs in the form of escort satellites or an ASAT system based on the ground is not important from a doctrinal point of view. However, what is important is to learn from the mistakes of the past by never again sending force projection assets into harm’s way without air and space superiority. (Bell 1999, 11)

War is not the time to develop defensive escort satellites. The time for development is between conflicts where there is time to develop not only effective weapons systems, but also doctrine to employ them. The Air Force Space Command is using exercises to develop doctrine for nonlethal space weapons. The doctrine value was demonstrated in a space exercise held at headquarters Air Force Space Command:

You may be able to do some things in space to demonstrate that you have capabilities that can hurt [the adversary] in another dimension, whether it is military or economic, and you can force some conversations at very senior levels that you might not otherwise be able to do in a very public environment. (Singer 2001, 2)

Space weapons could add a new, nonlethal aspect to combat. Coercion could occur by attacking targets in space, against satellites as economic weapons, rather than disrupting power or communications on the ground. The loss of capabilities a nation depends on for day-to-day operations may be the wake-up call a foreign leader needs. Many nations in the world would be isolated without satellite communications and direct broadcast satellites for television and radio.

Although nonlethal weapons are not getting much press, they are the most politically acceptable in today's world.

The military utility of an ASAT appears to be dependent on political and military factors limiting the feasibility of destroying satellites. The current focus of offensive counterspace operations on space supremacy through an ASAT seems to lack the flexibility and responsiveness needed to deny potential enemies information across the spectrum of conflict scenarios. (Lee 1994, 28)

You cannot negate the rogue nation's capability, because it is leased from someone else or you may economically destroy a corporation as well. The politically acceptable solution is in the middle of the spectrum. Delaying or disrupting information is more politically acceptable and is not irreversible.

Captain Robert Ramey put a legal spin on the same statement. According to the law of armed conflict, neutral states that were co-owners of INMARSAT during the Persian Gulf War risked their rights as neutral states. The investor states would have had no legal recourse if the system "had been lawfully targeted by enemy forces" (Ramey 1999, 168). Captain Ramey draws a similarity to a church or school also. Under the law

of war, schools and churches cannot be targeted, unless they are “used for military ends” (Ramey 1999, 168).

In general, the law of warfare puts the same constraints on space warfare that exists today in land, sea, or aerial warfare. Space warfare is “limited by the customary principles of proportionality, necessity, discrimination and humanity, and an array of treaty-based norms affecting the targeting of individuals and objects” (Ramey 1999, 180).

Space weapons can legally be deployed and military can effect certain “ends.” The next test is to see how they may influence the economic instrument of national power.

Space Weapons and the Economic Instrument of Power

The United States *National Space Policy* lists one of its goals to “enhance the economic competitiveness, and scientific and technical capabilities of the United States” (Clinton 1996). The global economy is extremely reliant on information and information processing, much of which relies on space (United States Space Command 1998). The *Department of Defense Space Policy* recognizes the economic importance of space as well: “The ability to access and utilize space is a vital national interest because many of the activities conducted in the medium are critical to U.S. national security and economic well-being” (Cohen 1999, 6).

According to the United States Space Command *Long Range Plan*, “The United States has \$100 billion invested in space today [1998]. Between now and 2000, another \$500 billion will be invested worldwide” (United States Space Command 1998). The \$10 billion for the capability to defend this tremendous investment is a small price to pay for insurance (Commission to Assess United States National Security Space Management

and Organization 2001, 20). The Space Commission tried to quantify the tremendous space capabilities the nation needs to protect:

Space-based technology is revolutionizing major aspects of commercial and social activity and will continue to do so as the capacity and capabilities of satellites increase through emerging technologies. Space enters homes, businesses, schools, hospitals and government offices through its applications for transportation, health, the environment, telecommunications, education, commerce, agriculture and energy. Much like highways and airways, water lines and electric grids, services supplied from space are already an important part of the U.S. and global infrastructures. (Commission to Assess United States National Security Space Management and Organization 2001, xi)

Besides the value of space investment to the economy, space weapons also contribute to the economic instrument of power by spinning off technology to the civilian sector. According to Sandy Lakoff and Randy Willoughby in *Strategic Defense and the Western Alliance*, “It is not difficult to identify specific civilian technological systems that have realized substantial benefits from military R&D in the past forty years.” Some examples they cite include jet aircraft, avionics, computers, transistors, integrated circuits, semiconductors, communication satellites and nuclear power (Lakoff and Willoughby 1987, 167,175). Spin-offs from the SDI program as of 1990 given an example of space weapons research impact to mankind and industry. The 1990 SDIO report to congress listed the following items:

Materials for leg braces and orthotics, a new generation of optical supercomputers, lasers in medicine, energy-efficient semiconductor switch, blood bank purification process, high-temperature materials for auto parts, diamond crystal coating technology, airport bomb detectors, nondestructive inspection techniques, cancer therapy research, laser radar, robotics and information technology advances. (Strategic Defense Initiative Organization 1990, E-4)

A more recent commercial spin-off came from the Ballistic Missile Defense Organization (BMDO). Under contract to BMDO, a small company called Lithium Power developed a

new type of rechargeable battery that will soon revolutionize battery power applications for small electronics, including laptops and digital cameras and even cars. The battery can be built to conform to any shape and can be recharged over 1,000 times. “It will enable electric vehicles to drive in excess of 300 miles before recharging” (SpaceDaily 2000). John Pike of the Federation of American Scientists feels strongly that U.S. commercial space applications are a direct result of the military space investment.

American dominance of the commercial satellite communications market is in no small measure a consequence of the scope of American civil and national security space operations. Despite post-Cold War downturns, these two sectors combined generate an annual cash flow that rivals the entire military budgets of all but a handful of countries. (Pike 1998, 29)

However, it is difficult to quantify the exact impact the military spending had on the industry or the economy. The authors also argue the inventions regarded as space spin-offs may have been invented without military acquisition programs (Lakoff and Willoughby 1987, 168). The impact of military research and development programs can also make it easier for similar civilian programs to proceed in parallel because of “economies of scale” generated by the production sector to produce the military items (Lakoff and Willoughby 1987, 169). For products similar to military requirements, the potential civilian benefits of military spending are great.

A recent RAND study reported 1996 revenues for the global space industry exceeded \$76 billion and includes employment of 800,000 people. The job market for the space industry increases by 40,000 each year (Johnson, Pace and Gabbard 1998, 67-68). This is a huge segment of the economy without protection in any conflict. Still, the ground segments, not the space segment, are the most vulnerable to attack, especially by

determined terrorists. There are also products with no civilian equivalent or need and thus little impact to the economic instrument of power.

The military investment in space is large and will only increase in the future.

The Department of Defense and the Intelligence Community are undertaking substantial and expensive programs to replace virtually their entire inventory of satellites over the next decade or so. These programs are estimated to cost more than \$60 billion during this period. (Commission to Assess United States National Security Space Management and Organization, 22)

Since the 1980s, military research and development “has become concerned with increasingly rare and exotic set of needs of modern weapons systems. The needs of such systems involve quantities and performance characteristics that have no obvious extensive counterparts in civilian products” (Lakoff and Willoughby 1987, 177). Even compatible products can have issues with security. Classifying technology or its application can keep pertinent military technology from making the leap to the civilian sector for years because of declassification issues or exposure of system liabilities. Still, investment in space weapons may offer economic benefits.

A significant potential impact would be the analysis and battle management software that would be required to execute space-based warfare. The potential impact on society in this sector is important for manufacturing technologies because of the “new types of artificial intelligence software and hardware for real-time processing, and the advances that can be made in the theory and practice of controlling large systems” (Lakoff and Willoughby 1987, 185).

Justifying a defense program based on potential positive impacts to the civilian economy is a weak argument at best. Technological spin-offs will happen, but not quantifiable enough to justify military research and development or spending \$10 billion

on a new weapons program. Benefits from military research and development are fringe benefits at best and not a reason to buy space weapons. Using the SDI program in 1984, Willoughby and Lakoff give an excellent example. “These benefits . . . have been purchased at immense cost--\$32 billion in 1984 alone” (Lakoff and Willoughby 1987, 186). The \$32 billion was justified for military research, not civilian research potential or economic benefits to mankind.

A government report titled *The Economic Fallout of Star Wars* concluded it is difficult to determine the impact of any specific program on the U.S. economy. “Unless the supporters of a specific project can demonstrate how it will help, we should assume that the effect is at best neutral” (Nimroody 1988, 137). The impact to the economy of commercial satellite communications or the economic benefits of the GPS program could be much more easily measured than something as diametrically opposed to civilian needs as an antisatellite weapon.

Lakoff and Willoughby also bring light to another potential impact of large government research and development spending. They theorize that large government research and development spending attracts engineers and scientists to military contracts. The exodus, in turn, drives up the cost for civilian industry to perform research and development. The military’s “deeper pockets” make it difficult for these economic sectors to compete in the world economy and contribute to the decline of the U.S.’s economic competitiveness (Lakoff and Willoughby 1987, 186-187). This seems to be a weak argument. Military spending and downturns in military-related civilian sectors do not correlate.

Developing space weapons would have some intangible value. The U.S. satellite market is in a downturn. Many of the large military and civilian spacecraft contractors have merged or bought out one another. Space weapons programs will help these companies maintain engineering and science talent to draw from when the next military or technological challenge faces the United States. The impact on the industrial base is magnified when the same weapons are sold to NATO countries as part of a collective security agreement. Another hard to quantify value is the experience the U.S. develops as it experiments in a new arena. Normally, prior research, even in other areas, can help make the next project easier. Making a more robust space force and space architecture helps the economy as well. Space weapons will require inexpensive and routine access to space. Development of continuous and real means to put weapons in space and replenish components, spares, and battle-damaged assets will be a boon for the commercial launch industry and commercial space market. Space research could be good for the economy, but why buy a space weapon when terrestrial tools are much cheaper?

Many options exist rather than deploying weapons in space for ASAT duties. Options include: “diplomatic efforts with third party providers, jamming C2 links” as well as destroying the ground station or even interfering with the computer network used to control the spacecraft (Spacey 1999, 59). The cost of a space weapon versus the cost of a GPS-guided bomb is a few orders of magnitude. A GPS-guided bomb to take out a satellite ground station costs approximately \$30,000. A generic satellite launch with booster costs about \$300 million. The economic factor leads to the choice of the 2000-pound bomb rather than the extremely costly space weapon. The choice is harder in a different scenario. The IRS (an Indian remote-sensing corporation) is selling imagery to

an enemy the United States is getting ready to launch a counterattack on. The imagery takes away the element of surprise and puts U.S. troops in severe danger. Now the choice becomes, launch a raid into a peaceful sovereign nation and take out the ground station with a 2,000-pound bomb or destroy the satellite with an antisatellite laser. Despite the cost, the choice becomes the space weapon. The United States may be able to afford space weapons for circumstances in the example above. The effects on other nations' economies may not be positive.

During the "Star Wars" debates in the 1980s it was felt continuing with the SDI program would "give the Kremlin a convenient excuse to demand further sacrifices from its people" to meet increased U.S. threats (Nimroody 1988, 196). *The Economic Fallout of Star Wars* study felt, "Such a strategy would prove entirely counterproductive to the long-term U.S. interest in encouraging freedom and democracy in the Soviet Union. Today in Russia, the realities probably are not much different. Russia and other nations seeking to counter the U.S. threat from space would most likely seek asymmetric measures to counter U.S. capabilities. Impact to U.S. allies' capabilities are also important to address."

The Department of Defense views international collaboration and alliances as key to the economic interest of national power as well as strengthening collective security: "Such cooperation shall forge closer security ties with the U.S. allies and friends, enhance mutual and collective defense capabilities, and strengthen U.S. economic security" (Cohen 1999, 14). United States allies and citizens both rely on them to do what is in the best interest of national and collective security. The thesis will now look into some qualifiers that may affect the decision to deploy weapons in space.

Do Nothing

The first qualifier is doing nothing. In the absence of a well-defined threat, canceling programs to deploy weapons in space would allow redistribution of the funds to other areas of defense or government programs. The scope of this thesis does not include judging the merits of government-wide programs compared to the merits of deploying weapons in space. Simply from the Space Commission and other sources listed above, doing nothing will disadvantage the United States in the future. At a minimum, to maintain technological prowess in defense and security in space, the United States needs to continue development of these technologies. A important lesson from the middle-age fortification struggles can help today, “The option to retire behind walls virtually invited enemies to ravage the surrounding countryside; only a good offense could achieve total protection” (Codevilla 1988, ix).

Limiting Treaty

Three treaties, the Outer Space Treaty, the ABM Treaty, and the Limited Test Ban Treaty currently govern weapons in space. None of these treaties specifically ban ASAT weapons, weapons travelling through space like ICBMs or weapons that could provide space defensive capabilities.

Some might argue that state practice and such agreements as the Moon Treaty have created a legal norm of peaceful use of outer space or the avoidance of orbital arms races, it is unquestionable that space can be and has been used for military purposes. (Greenberg, 23)

Roger Handberg in *Seeking New World Vistas* agrees that there are no treaties banning space-based weapons; however, he concludes, “The passage of time has ploughed a deep

trench in international expectations that weapons in fact are forbidden” (Handberg 2000, 236).

Paul Stares brings up one of the major reasons the U.S. should not sign up to a treaty banning space or ASAT weapons. “The presence of the Soviet interceptor and of so-called ‘residual’ ASAT weapons are cited as the main reasons that an ASAT ban would not be practicable or even desirable” (Stares 1987, 38). The United States signed the ABM Treaty with the thought both parties would abide by the treaty. One of the former Soviet Union’s greatest violations of the treaty was a radar site they built near Krasnoyarsk in Central Siberia (Worden 1987, 11). This was one of many suspected violations by the U.S.S.R. of the ABM Treaty.

The Russians are also accused of violating the 1972 Biological and Toxin Weapons Conventions. The evidence is extremely damning, especially since it comes from a former director of one of their largest biological warfare facilities. In their book *Biohazard*, Ken Alibek and Stephen Handleman detail the huge biowarfare program that the Russians undertook, despite being signatories of the Biological and Toxin Weapons Convention.

Over a twenty year period that began, ironically, with Moscow’s endorsement of the Biological Weapons Convention in 1972, the Soviet Union built the largest and most advanced biological warfare establishment in the world. At the same time, through our covert program, we stockpiled hundreds of tons of anthrax and dozens of tons of plague and smallpox near Moscow and other Russian cities. (Alibek 1999, x)

Signing up to ban ASAT weapons with Russia, given past performance, is difficult to justify if they will not abide by the treaty. This thesis will not offer a “score card” on Russian compliance with treaties. However, evidence of Russian compliance or non-

compliance is important when determining the value of a space arms limiting agreement. In the opinion of one author, “At this point in our relations with the Soviet Union we are compelled to conclude that the legal order established through the arms control agreement is minimal” (Almond 1984, 233).

A treaty limiting development of space weapons would have the effect the Russians and Chinese are seeking. The treaty would “freeze” the U.S. technological advantage and allow U.S. adversaries to “catch up” (Brown 1994, 39). The Space Commission concluded,

The U.S. must be cautious of agreements intended for one purpose that, when added to a larger web of treaties or regulations, may have the unintended consequences of restricting future activities in space. (Commission to Assess United States National Security Space Management and Organization Commission 2001, xviii)

The ABM Treaty has been an effective deterrent to the U.S. deploying an anti-missile system to protect against limited strikes. The ABM Treaty also adds power to Russia’s information and diplomatic instruments of power. In a recent article, William Safire termed the ABM Treaty as “giving Putin [Russia’s President] veto power” (Safire 2000, B7). “Vladimir Putin stopped the United States . . . from beginning to build a defense against missiles from rogue nations and terrorists” (Safire 2000, B7). An effective treaty would ban development, testing, and deployment of ASAT weapons of all types. This would have a side benefit of banning ABM systems being developed as ASATs as well (Jasani 1987, 43). Paul Stares does not see this as a benefit, “Because of the almost symbiotic relationship between BMD research and ASAT development, placing constraints on ASAT weapons could hamper the antimissile program in major

ways” (Stares 1987, 143). The ASAT arms control may keep the U.S. from protecting its citizens against a rogue nation weapons of mass destruction attack as well.

A treaty would be ineffective if it simply banned deployment or countries signed up to no first use (Jasani 1987, 43). Because of the myriad of countries with assets in space, a very broad agreement would have to be reached with all space-faring nations.

The Aspen Security Group advocates taking measures to promote stability in certain areas. Some specific agreements they would seek include the following goals:

Suppress the development of prompt or instantaneous threats to our critical command, control and warning satellites at high altitudes; make ad hoc attacks using residual ASAT capabilities more cumbersome, expensive and transparent; to reinforce the beneficial effects of our independent spacecraft survivability measures at all attitudes; and to avoid a major commitment of resources to the advanced satellite attack mission that would drive up the costs of satellite protection dramatically in the long run. (Perry, Scowcroft, Nye and Shear 1987, 15)

It would be difficult to totally ban all space weapons, but may be helpful to ban large systems as long as only residual-like capabilities remain.

Other agreements that would benefit all parties would be like the 1972 Agreement on the Prevention of Incidents On and Over the High Seas. This agreement “helped reduce provocative encounters between naval vessels and aircraft . . . and is often cited as a model for acting sensibly in space” (Perry, Scowcroft, Nye, and Shear 1987, 15).

An interesting alternate viewpoint came from Professor Karl Grossman. Professor Grossman’s point of view is that the U.S. should not build and deploy space weapons because it will not be accepted by the other nations of the world, especially Russia and China. He feels they will “respond in kind.” He feels the U.S. will not be able to control space and it will end up as “another arena of war” (Grossman 2001). “Sticking to the

Outer Space Treaty is, I think, the key. The U.S. should strengthen the treaty, have it specifically say no weapons should be deployed in space not just weapons of mass destruction, and nuclear weapons as the treaty currently provides” (Grossman 2001). This agreement was considered at the United Nations in 1999 and 2000, put forth by China and agreed to by many nations of the world. “That is not to the liking of the U.S. government today” (Grossman 2001). Professor Grossman also feels an important part of any treaty is developing “verification mechanisms.”

By opening up space for its own seeming military advantage now, the U.S. military is being very myopic--opening up a Pandora’s Box of problems that will result in all kinds of money being wasted and war being brought to a new dimension when, just maybe, humanity can continue to keep warfare out of space. (Grossman 2001)

The Union of Concerned Scientists echoes Professor Grossman’s concerns, “If the United States is concerned about satellite vulnerability, it should push for treaties restricting the development of anti-satellite weapons” (Singer 2001, 1).

Worldwide consensus agrees an arms race in outer space must be prevented. The United Nations General Assembly passed a resolution entitled “Prevention of an Arms Race in Outer Space” by a vote of 138-0. Two nations abstained: the United States and Israel (United Nations General Assembly 1999). Interestingly, Jordan, the thesis proposed neutral nation, did not participate in this resolution.

Moscow, which can no longer afford to compete with the U.S. and Beijing, which fears this country will block its plans to seize Taiwan, are working hard to line up support in the United Nations against what Beijing calls U.S. plans to dominate the world. Since only a few countries have the technology or funds needed to build space weapons, it is an easy vote for the have not majority in the U.N. to oppose the U.S. on this issue. Russia and China are trying to constrain U.S. power through arms control, with the support of the U.N. members that resent the dominant U.S. position in the world and have nothing to lose, and groups in this country that believe the best defense is no defense. (Hackett 2000)

Russia and China are using the United Nations and the peaceful leanings of many nations of the world to force the United States to stop technological development of space weapons for the sole purpose of gaining parity. The situation is clear. The United States will not accept the United Nations' leadership on limiting space weapons. The United Nations could strong-arm the United States into an agreement on space weapons. The U.N. inability to control rogue states will keep the U.S. from signing. Benefits of arms control are fairly clear.

Research and Development With No Deployment

A recently completed RAND study titled *Space: Emerging Options for National Power* concluded research and development needs to continue on space weapons. "Aside from ballistic missile defenses, it is more difficult to justify the development of space-based weapons at this time but the options should be maintained through research and development activities" (Johnson, Pace, and Gabbard 1998, 81). Research and development is key to keeping options open. The study also concluded that ballistic missile defenses are justifiable and should be developed. Weapons that can be used to counter ballistic missiles are excellent against low-orbiting satellites as well. Research and development can continue on ABM weapons without having to spend an additional large sum of money on other types of space weapons.

The thesis previously covered potential threats and why space weapons are important for the future of the military. The research and development will explore the technologies and concepts for ASAT weapons, force application, and space-based defenses. The research and development helps the United States maintain its powerful

advantage in space. New technologies will counter evolving space threats more easy than is foreseen today and will change the answers to questions answered in the studies cited in this thesis. The United States needs to keep investment in research and development to maintain their edge. The research and development will close some doors and open others. The promise of attacking targets nearly instantaneously from space is too awesome a deterrent capability to ignore.

Defensive Only Weapons

Defense is too important a capability to write off as destabilizing or too complex. Defensive weapons could be deployed in ways to mitigate some of the political and destabilizing concerns mentioned earlier in the thesis. The U.S. could deploy defensive weapons in space in key orbits that will protect United States assets and not put other nations' satellites in danger (or at least constant danger). The destruction of warning satellites is very destabilizing. A defensive weapon used to protect U.S. national technical means in a low-earth orbit would not be physically capable of threatening a Russian missile warning spacecraft in a molniya orbit. The defenses could even be on the traditional force enhancement satellite as a secondary payload. Instead of just arming the satellite with passive defenses, like laser deflecting mirrors, they could be armed with active defenses as well. The active defenses could be kinetic weapons, like a small kill vehicle, a small radar jammer for defense against radar-guided kill vehicles or an optical dazzler for optically guided ones. Done correctly, deployment of defensive weapons could maintain the high ground of space for peaceful purposes and still offer a more secure suite of space capabilities that can be depended on in time of a crisis.

Weapons that are more powerful could also be deployed, but could be degraded before launch. Detuned weapons, with weaker lasers or low amounts of fuel “ammunition,” may be acceptable solutions to the international community. The weapons may be capable of killing a few satellites or warheads, but not total annihilation of space capabilities that might be expected to precede a first strike or surprise attack. Weapons on the ready in silos may also be okay. Deployment decisions could be made public in advance and only in times of need would the weapons be deployed. The silo-based weapons could be open for foreign inspection whenever required. The Space Commission made other recommendations for defensive capabilities,

New technologies for microsatellites, hardened electronics, autonomous operations and reusable launch vehicles are needed to improve the survivability of satellites on orbit as well as the ability to rapidly replace systems that have malfunctioned, been disabled or been destroyed. (Space Commission 2001, 32)

The current defensive ABM debate is germane to the issue of defensive space weapons as well. For many of the same reasons the United States needs to defend itself against limited strikes of ballistic missiles, the U.S. also needs to protect space assets from limited strikes as well. Limited strikes could be accomplished with a small number of deployed weapons that would hold fewer targets at risk. Most countries would not follow suit to develop an expensive weapons system to hold only a small number of targets at risk. The United States may deem this capability necessary for credibility of its space dominance and ability to launch a nonterrestrial attack without necessarily provoking a sovereign nation. Many of the weapons that would contribute to a ballistic missile defense would be excellent ASAT weapons. The airborne laser (ABL), for instance, is predicted to have a range of hundreds of miles (Boeing Company 2001). This

range is sufficient to engage many low-orbiting spacecraft. The ABL is currently not designed to track satellites. Engaging satellites is a small technological step from engaging ballistic missiles. Defensive weapons can overcome many potential problems if designed and deployed correctly.

Proper deployment would also involve U.S. allies. The Space Commission took great care to discuss the importance of keeping allies abreast of U.S. plans along the way. Close coordination with U.S. allies will make defending coalition space assets more palatable in the eyes of the world. Offering defenses for the U.S. allies may make defensive weapons even more acceptable.

A policy of deterrence would need to be extended to U.S. allies and friends, consistent with U.S. treaty obligations and U.S. interests. In the case of NATO, the U.S. might consider whether a planning group should be formed to develop a common appreciation of the threats, discuss potential responses and consult on the formulation of alliance policy and plans to deter and defend against threats from space. Only by extensive prior consultation, planning and appropriate exercises will the U.S. have the cooperation it would need in a crisis. (Space Commission 2001, 29)

The deterrence value of space is critical to the national defense of the U.S. According to the *Department of Defense Space Policy*,

The deterrence of aggression and the defense of the United States and its allies will be strengthened by ensuring that an adversary cannot obtain an asymmetric advantage by countering our space capabilities or using space systems or services for hostile purposes. (Cohen 1999, 2)

The defense of space assets is critical and can be done in a stabilizing way. Collective defense will strengthen U.S. alliances. However, the U.S. must tread carefully. “Such entanglements limit the options available to a degree much more restrictive than the military may be willing to accept” (Handberg 2000, 233). The U.S. Space Policy affirms the tremendous worth of U.S. space assets to the U.S. diplomatic, military, and economic

instruments of power. This worth provides motive for adversaries to attack U.S. space capabilities (Cohen 1999, 3). Defense is a prudent option.

With Offensive Weapons

Defense is a prudent option, but the best defense is not necessarily a good offense. It is also difficult to convince anyone that defensive weapons in space do not have any offensive capability. The Office of the Secretary of Defense's 2001 *Space Technology Guide* calls out technology and weapons systems to be used for "defensive force application." The "offensive force application" section deals only with space based technologies that would aid in an atmospheric strike, so-called "force enhancement" capabilities (Office of the Secretary of Defense 2001, 11-1). Offensive weapons are clearly called for in the Space Commission report:

The U.S. will require means of negating satellite threats, whether temporary and reversible or physically destructive. The senior political and military leadership needs to test these capabilities in exercises on a regular basis, both to keep the armed forces proficient in their use and to bolster their deterrent effect on potential adversaries. Besides computer-based simulations and other wargaming techniques, these exercises should include "live fire" events. (Space Commission 2001, 29)

What is surprising about the report is negation capabilities become a forgone conclusion and the commission recommends exercising and testing the weapons when deployed similar to ICBM confidence testing.

Exercising space weapons has also been addressed by the U.S. Space Command. In a recent space exercise, the United States "launched a preemptive strike, using Common Aero Vehicles against Ground Based Lasers deep inside Red's [enemy] country, destroying the weapons within an hour of notification" (Scott 2000, 54). Those time lines are simply not available with conventional bombers or cruise missiles. Critical

targets require quick action and only a weapon using space can get there in such a short time line. Space weapons offer “a means to rapidly strike very important, time-sensitive targets deep inside a large country” (Scott 2000, 55).

The United States Space Command envisions space-based lasers, conventionally armed ICBMs, high-power microwave (HPM) weapons, space operations vehicles, space-based interceptors, and space-orbiting platforms for force application from space. In addition to rapid employment capabilities, these weapons have the added advantage of not requiring forward deployment. Forward deployment is important to “shaping and preparing a region, but sovereignty issues may impede it” (United States Space Command 1998). The *Long Range Plan* also requires 60 percent nonlethal, reversible effects (United States Space Command 1998). Besides using offensive space weapons for space superiority needs, the role of space in information warfare must also be mentioned. Roger Handberg ties information warfare and space weapons effects together.

Assuring information superiority leads operators to consider conducting both offensive and defensive information warfare. As a result, space applications become essential components in these efforts by being both potential high priority targets, and, conversely, vehicles for attacking other nations information assets. (Handberg 2000, 196)

A military case can be made for deployment of offensive space weapons. Arguments exist to counter many of those as well.

According to William Spacey in *Does the United States Need Space Based Weapons*, the debate against space-based weapons for assaulting atmospheric targets is comparable to the arguments against space-based defenses. If the United States deploys offensive weapons in space, other nations will be obliged to do the same thing (Spacey 1999, 6). Deploying weapons in space will enable a country to attack the United States

without having to develop a large, traditional conventional force. The U.S. cities could be endangered by new threats (Spacey 1999, 6). There are many countries with the capabilities to launch satellites and, therefore weapons. By coaxing a space race, the United States could be putting its citizens at increased risk (Spacey 1999, 6). Spacey's arguments lead to the conclusion that instead of making the United States safer, space-based weapons will cause increased danger for the continental United States. The benefits of limiting offensive space arms are clear. By limiting space weapons, the U.S. can protect the military and economic value of its satellites as well as prevent force application against its territory from space (Stares 1987, 142).

There are excellent arguments for deploying weapons in space, both offensive and defensive. Chapter 5 will attempt to show which decision is right for the United States.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

According to this thesis' research, deploying weapons in space would disadvantage the United States in the long term. The evaluation of the options presented in chapter 3 led to the choice of continuing research and development with a limiting treaty (Option 3A) as the highest scoring option. The following summary and conclusions will explain how this outcome was reached.

Multitudes of opinions exist regarding the future of United States' involvement in space and whether the next step of militarization, weapons deployment, should take place. U.S. policy on space weapons and space control is widely published. The policy information is pertinent to all categories of national power. The recently released Space Commission report summarizes the U.S. government's position:

In the coming period, the U.S. will conduct operations to, from, in, and through space in support of its national interests both on the earth and in space. As with national capabilities in the air, on land and at sea, the U.S. must have the capabilities to defend its space assets against hostile acts and to negate the hostile use of space against U.S. interests. (Commission to Assess United States National Security Space Management and Organization 2001, 21)

The Commission on National Security in the 21st Century echoes the Space Commission position in the report:

Protection must also be assured against threats that are clearly on the horizon. Unfortunately, the superiority the United States enjoys today in space is unlikely to persist. Many countries have space capability or access to space. A few states already have the satellite and weapons technology to threaten U.S. space assets, and more will acquire such technology in due course. (Commission on National Security in the 21st Century 2001, 70)

The reports above, which have only been released for a short time, have already had an impact on the new administration. The Department of Defense and the Armed Services will now have to respond to the Commissions' recommendations and potential impacts.

It is out of the scope of this thesis to predict how the Department of Defense will respond. This thesis will now briefly summarize the research and assign numeric values to categories of the diplomatic, information, military, and economic instruments of national power in order to form a conclusion. The base conclusion will be based on deployment of defensive weapons and be used to fill the column for option 3 as addressed in chapter 3 of this thesis. The other columns will be filled based on the discussions following the main sections that address each instrument of power for the basic defensive weapons case. The answers to the primary and secondary research questions were considered with reference to each instrument of power where applicable.

Effects on the Diplomatic Instrument of Power

The diplomatic perspective was evaluated based on impacts to potential adversary, ally, and neutral categories. The Commission on National security in the 21st Century gives a brief summary of the potential diplomatic impacts:

The United States should continue to support general international norms that protect space as an international domain where all participants are free to pursue peaceful activities. The problem is that unilateral U.S. steps taken to assure military superiority in space may be seen by others as simplifying an ability to deny access to space and freedom of action there. Even if that ability is never used, it could complicate the ability of the United States to shape a benign international environment. (Commission on National security in the 21st Century 2001, 79)

The above policy is pertinent when considering each of the categories' impacts.

Potential Adversary

Russia disagrees strongly with United States policy regarding space weapons. Russia is the closest peer competitor in space that is considered a potential adversary. Russia has deployed weapons in space in the past and has a robust ability to develop and deploy space hardware. Russia maintains residual ASAT capability and has tested and deployed space weapons. Indications exist that Russia is trying to freeze the U.S. weapons program in order to catch up or maintain strategic parity in space. The overt Russian position requires maintaining space for peaceful uses only.

Russia's space for peace doctrine is grounded on four principal concerns. First, space weapons are destabilizing because of their potential first-strike implications. The current strategic balance is comfortable for Russia. Space weapons could decrease crisis stability. Secondly, space weapons are destabilizing because they will likely cause a space-race between major space-faring, space-dependent nations like Russia and China. Russia fears a head-to-head technology competition with the U.S. Thirdly, Russia cannot afford to participate in a space race and is losing world political strength because of their degraded space capability. Lastly, the U.S. has continued experiments since the beginning of the "Star Wars" era and has many promising technologies, from simple kinetic energy weapons to high technological beam weapons. The Russians are behind in these technologies at the present time and do not have monetary resources to further research and development.

Despite the fact Russia does not have the economy to compete at present, they have the resources to compete in the long term. The U.S. should expect any program to deploy weapons in space to drive adversaries like Russia to asymmetric means to counter

perceived U.S. threats. The impact of space weapons in this category is negative (see table 2).

Ally

The United States' closest geographic neighbor and one of its closest allies, Canada, disagrees with the United States' plan to weaponize space. Canada and the United States are long time allies with over eighty treaty-level defense agreements and forty-two years in a joint aerospace warning through NORAD. Despite this, Canada does not support missile defense and feels space weapons are destabilizing. With U.S. diplomatic overtures, Canada may soften their policy as Europe has. Canada cooperated in the initial Star Wars research and may be convinced by U.S. diplomacy that space weapons are in their national interest. Some in Canada already feel that way. Space weapons would add to the Canadian-U.S. collective security.

Still, Canada likes the strategic security provided by the ABM treaty and does not currently want part of deploying destabilizing arms. Also, opposition to space weapons for Canada is cost-free and does not require them to share costs of defense. It is in Canada's best interest to wait for the U.S. to perform the research and development and then join the team.

Canada has another political reason to resist U.S. policy. Canada will have no choice but to accept the outcome of the U.S. policy debate on space control if they invest with them. Canada is in a difficult position. By proximity, the Canadians and U.S. share some space assets. Canada has conceded their space assets are vulnerable and any loss would be traumatic. An attack on the U.S. would probably include Canada as well. Canada may be drawn in through collective security, economic benefits through weapons

contracts, and political outreach. Despite the potential for cooperation, Canadian policy does not support space weapons and is rated negative for the baseline defensive weapons case (see table 2).

Neutral

Jordan's space policy is not overt. Jordan did not participate in important votes in the United Nations to block the weaponization of space. As a nation, loss of space capabilities would have a small impact on the nation and many other neutral nations like it.

Jordan, however, like other neutral nations, has general concerns regarding space. Space capabilities are widespread in the world and the United States is the lead nation in space. The United States must take advantage of their lead to shape the regulatory environment, just as they are shaping the missile defense debate. Space is already militarized, but weapons free. The U.S. must not allow defense to become illegal, the way it has with missile defense.

A weaponization strategy will have drawbacks. Space is currently not a battleground. The negative political fallout of the U.S. policy of deploying weapons in space is potentially damaging to U.S. prestige in the world. As far as neutral nations are concerned, it is a negative impact for the United States to develop and deploy weapons without a threat. The impact is positive if the United States creates a safer environment for every nation's assets. Because of the current world situation with neutral nations and need for security, impact to neutral countries is rated neutral (see table 2). The Space Commission shares this opinion:

The United States recognizes space as a global commons, but if it does so without qualification, it risks being surprised and overtaken militarily in a crucial environment by some future adversary. (Commission on National security in the 21st Century 2001, 79)

Effects on the Information Instrument of National Power

Deploying weapons in space would make the United States appear to threaten other nation's space assets. Despite claims of threats by United States Space Command and many others, there is no known overt threat that currently justifies deploying weapons in space. The United States would gain a potent deterrent against nations threatening U.S. space capabilities by holding threats in check with space weapons.

The United States relies on its space assets for information superiority and force enhancement and in the future, force application and defense. Enemies will take advantage of this acknowledged weakness to gain an advantage against the United States. The United States must defend their assets to portray their information instrument as robust. Space is a center of gravity whose negation would have serious consequences for the U.S. defense. This center of gravity not only needs protection, but to maintain a viable defense, the defense must also be legal under international law. No treaty exists to ban weapons deployment in space.

Despite being legal, the informational backlash could cause the United States to be viewed as hegemonic, not only attempting to dominate space for the exclusive use of the United States, but also violating over forty years of the peaceful use of space. Russia and other nations have the information edge in this arena and consistently pressure the United States to abandon these plans. Other nation's counterinformation campaigns have been successful because they portray the United States as acting only in their own self-

interest, despite impacts on the remainder of the planet. The United States is sensitive to world opinion.

If the U.S. does make the decision to develop and deploy weapons in space, there will likely result a space-based arms race and arming space is nearly irreversible. Space weapons would give the U.S. a potential first-strike weapon that would threaten every space-faring nation's assets.

On the positive side, space weapons give the U.S. population a greater sense of security. The population would have confidence that space assets are being defended. A credible threat will make other nations think twice about attacking U.S. assets for fear of losing their own capabilities. The United States could become the guarantor of peace in space with a defensive weapons capability. This would work if they can establish benign dominance. Benign dominance would be a positive impact to the U.S.'s information instrument.

Not only would the defensive weapons maintain peace in space, the deterrent value of space weapons may assist in avoiding conflict on earth. Attacking adversary's space assets may send a message that will quickly end the conflict. Conflict resolution by space combat is more positive than atmospheric combat because a conflict in space avoids bloodshed, troop deployment, basing rights, sovereignty issues, overflight permission, and civilian collateral damage.

The pluses and minuses of the information instrument lead to a neutral assessment (see table 2).

Effects on the Military instrument of National Power

History is replete with instances in which warning signs were ignored and change resisted until an external, “improbable” event forced resistant bureaucracies to act. The question is whether the U.S. will be wise enough to act responsibly and soon enough to reduce U.S. space vulnerability. Or whether, as in the past, a disabling attack against the country and its people--a “Space Pearl Harbor”--will be the only event able to galvanize the nation and cause the U.S. Government to act. We are on notice, but we have not noticed. (Commission to Assess United States National Security Space Management and Organization 2001, 25)

The case is clear for the military advantages of deploying weapons in space. Despite opening the door for other nations to follow suit, space weapons can help make the United States access to and use of space secure. The United States holds the technological advantage now. By taking advantage of this situation, the United States could ensure the freedom of space for peaceful use of all nations, with no threat of denial by adversaries. United States’ space capabilities are fragile and defenseless. Weapons in space provide security to the huge military and commercial interests the United States has in space.

The United States’ policy demands control of space as enumerated in the *National Space Policy* and recent commission reports. U.S. *National Space Policy* is criticized because the sanctuary camp believes deploying weapons will endanger the United States’ space capabilities. Space is peaceful now; deploying weapons will turn it into a battlefield. By waiting for an adversary to deploy first, the United States is relinquishing superiority.

The airplane, tank, submarine, mass aerial bombing, nuclear weapons, and the ICBM were all greeted with skepticism, yet each altered the nature of warfare. The arguments against beam weapons tend to assume US and Soviet Strategic weapons will remain unchanged the next 30-50 years. (Peebles 1983, 184)

Defense of space capabilities is too critical to write off as destabilizing or a capability that is too hard to achieve. Only deploying weapons in protective orbits could mitigate some destabilizing characteristics. Defending space assets will make the capabilities more robust and survivable. Defending only the most critical satellites may not be as destabilizing. A limited capability would not contribute to a first strike. Another way to mitigate concerns is to only deploy defenses when an adversary is shown to have offensive capabilities. Rapid deployment capability would be necessary to routinely access space for this approach to be successful. Deployment on need would prevent a race, keep space “weapons free,” and still deter some enemies.

Developing limited defenses is probably not acceptable. Space weapons are an expensive investment to threaten a few key targets. The U.S. has the resources to make such an investment. Few other nations could make the required investment to maintain a limited capability. Keeping allies abreast and involved is important in making any weapons deployment work. Burden-sharing and collective security would ensure stable weapons’ deployment. A weapon for collective security’s sake makes the weapons more acceptable to the U.S. public as well as U.S. allies. There is a drawback to collective security as well. The allies would have veto power over U.S. defense. Defensive space weapons, despite added threat to friendly systems, are a high positive advantage to the military instrument of power (see table 2).

Effect on the Economic Instrument of National Power

Economic activity, whether building weapons or cars, has a positive impact on the economic instrument of power. Sharing space weapons capabilities with U.S.’ allies gives the country better trade balances and keeps the defense industrial base healthy.

However, weapons are not built for the sole purpose of economic benefit to the nation, and if solely based on economic benefit, the outcome would be neutral. Past examples show positive impacts to the economy and development of new technology that are beneficial to U.S. citizens. Overall, the economic impact of a space weapons program would be positive to the economic instrument (see table 2). This is the last piece and completes the results for the baseline case, Option 3. The remaining sections will explain valuations and variations associated with the other options and complete table 2.

Treaty Impacts

A treaty limiting deployment of weapons in space is not constructive and closes off too many military options. The limiting treaty would not just ban space weapons like ASATs, but also weapons that offer security, such as limited ballistic missile or spacecraft defense. Besides making defense impossible, the treaty would create problems. Verifying compliance would be extremely difficult. Most ICBMs can be used in an ASAT role and would not be banned in a space weapons treaty. A treaty is risky because it is difficult to determine if a country is developing a space weapon or planning to utilize a residual capability. Anything launched into space is a potential ASAT, inspected or not.

A treaty has positive implications as well. A treaty would require less survivability measures for spacecraft, maintain current strategic stability, save costs to all potential adversaries in a space race, and strengthen nuclear arms control measures. Although the treaty has potential positive implications, they are overshadowed by the military options given up.

Doing Nothing

Stopping all development of space weapons leaves U.S. space capabilities too vulnerable and risks erosion of the U.S.'s technological advantage. This vulnerability is an even greater risk when lacking a comprehensive limiting treaty. Research must continue to counter threats of “break out” by other nations. Doing nothing unacceptably shifts the advantage to the potential adversary and is judged negative militarily, with or without a treaty. Doing nothing, with or without a treaty, would have a negative economic impact because less research and development money would be spent in the high technology sector. The United States may see its space technology edge deteriorate also, hampering the defense industrial base. Doing nothing but also having a comprehensive treaty (option 1A) is positive diplomatically in every respect. Without a treaty, ally is rated neutral, because the collective security power balance may erode if the United States abandons its technological lead in space. Adversary and neutral rate a positive impact because this is the position they would like the United States to take, with or without a treaty. The information instrument of power would be negatively impacted if the United States decides to do nothing because they would lose prestige as world space leader. With a treaty, the impact would be positive. The United States would be seen as a peaceful nation, upholding the peaceful use of space for all nations. The ratings of the “Do nothing” and “Do nothing with treaty” are summarized in table 2.

Continue Research and Development Without Deployment

Continuing research and development is a solid option. Diplomatically, continuing research and development does not change the current United States position and would be rated neutral to the allies, adversary and neutral. With a limiting treaty, the

diplomatic instrument would become positive concerning the potential adversary. The Russians have consistently held their position to ban space weapons. From the standpoint of the information instrument, continuing research and development would be positive because it would show the United States to continue its technological advance. The treaty limiting deployment would strengthen the positive rating. The military instrument would rate a medium, because weapons development would continue and deployment could be made in the future if required to counter a threat. The military option becomes a negative with a limiting treaty. The treaty would make it illegal for the United States to deploy weapons under development and it would take effort to get deployment approved if it became necessary. The economic instrument would be positive, because money would be spent in the high technology sector and would help keep the United States space industry robust. The treaty would have no impact if research and development were continued under either scenario. The United States would accumulate many of the pluses of owning space weapons and avoid many of the negative situations.

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Offensive Versus Defensive Differences

The answer does not change dramatically by deploying strictly defensive weapons. The answer does not change because defensive weapons, by design, will have offensive capability.

Stopping all development of space weapons leaves the nation too vulnerable and risks erosion of the U.S. technological advantage. Research must continue to counter threats of “break out” by other nations.

The valuation of the “deploy weapons” option answer does not change dramatically when considering deploying strictly offensive weapons militarily. Saying weapons are “defensive only” could be neutral to the diplomatic and informational instruments of power, but it is negative if the weapons are for offensive purposes. Defensive only weapons are more politically acceptable than offensive weapons. Offensive weapons are less strong an advantage militarily than defensive because they could be destabilizing. Offensive weapons offer the advantage of isolating conflict to space, engaging in conflict without deploying troops, and rapidly engaging targets worldwide in minutes.

Offensive weapons have some excellent side benefits. Rapid force application from space is attractive because it saves forward basing costs, can quickly attack critical centers of gravity, and does not put airmen or soldiers in danger. Foreign basing, overflight, and the sovereignty issues of current conflicts that haunted planners in Desert Storm or allied force can be completely avoided. Space strike also has little warning time: from decision to strike to force application on target is rapid. These same advantages the U.S. would gain also apply to a potential adversary with added benefits. Using space to assault ground targets may allow other countries to threaten U.S. targets without developing an Army, Air Force, Navy or Marine Corps. Space weapons are expensive, but are cheaper than fielding traditional armed forces.

Banning space weapons deployment allows the U.S. military to protect the military and economic value of its satellites via sanctuary. Sanctuary also prevents force application against the United States from space. Banning space weapons totally is the only realistic solution if the decision is to maintain sanctuary. Some defensive weapons

can clearly be used to perform offensive functions as well. The U.S. deployment of weapons in space will cause other countries to do the same and put U.S. citizens at increased risk in the long term. This makes the assessment of offensive weapons positive, but low militarily. The economic instrument is unchanged when moving from defensive to offensive weapons. Money would be spent in the high technological sector and savings to conventional forces could be achieved by moving some of those functions to space.

Diplomatically, the neutral case is the only one that changes. The neutral countries were rated neutrally for the defensive case. The U.S. unilaterally deploying offensive weapons to space is not diplomatically positive to any nation. This finishes the evaluation matrix.

Table 2 is the finished, weighted matrix. The matrix shows the research and development option with limiting treaty to be the strongest rated when viewed through the lens of the instruments of power. This option is strongest because it keeps the weapons option open technologically, while limiting use until the political situation would allow for deployment. The next case is unweighted results in table 3. Table 3 is important because showing the results unweighted shows that if you disagree with the weighting scheme used in table 2, the unweighted results can also be viewed and contrasted. The results came out nearly the same. The biggest difference results in the weighting of the diplomatic interest as the most important. The unweighted option considered each variable as an equal, and thus the continue the research and development option without treaty became the best choice. The unweighted option does not penalize because of adversary opinion as heavily as the weighted option.

Table 2. Weighted Results
Options Versus Instruments of Power

	1 Do Nothing	1A w/ Limiting Treaty	2 Continue R & D	2A w/ Limiting Treaty	3 Deploy Defensive Weapons	3A Deploy Offensive Weapons
Diplomatic - Ally	Neutral	Positive	Neutral	Neutral	Negative	Negative
Diplomatic - Neutral	Positive	Positive	Neutral	Neutral	Neutral	Negative
Diplomatic Potential Adversary	Positive	Positive	Neutral	Positive	Negative	Negative
Informational	Negative	Positive	Positive	Positive	Neutral	Negative
Military	Negative	Neutral	Medium	Low	High	Low
Economic	Negative	Negative	Positive	Positive	Positive	Positive
	-3.5	2	4.5	7	-2	-7

Table 3. Unweighted Results
Options Versus Instruments of Power

	1 Do Nothing	1A w/ Limiting Treaty	2 Continue R & D	2A w/ Limiting Treaty	3 Deploy Defensive Weapons	3A Deploy Offensive Weapons
Diplomatic - Ally	Neutral	Positive	Neutral	Neutral	Negative	Negative
Diplomatic - Neutral	Positive	Positive	Neutral	Neutral	Neutral	Negative
Diplomatic Potential Adversary	Positive	Positive	Neutral	Positive	Negative	Negative
Informational	Negative	Positive	Positive	Positive	Neutral	Negative
Military	Negative	Neutral	Medium	Low	High	Low
Economic	Negative	Negative	Positive	Positive	Positive	Positive
	1	1	3	2	1	0

In both cases, the results show the United States should continue to develop weapons to deploy in space. This research and development should start with defensive technologies. Offensive weapons are the lowest-rated option and are not politically viable at this time. As access to space improves, space-based force application weapons may be used to lessen the need for ground, air, and naval forces and eventually lead to force structure changes. The results in table 3 show negative areas where U.S. policy makers and the military must work to gain acceptance and make the weapons have a more positive impact.

It's politically insensitive, but it's going to happen. Some people don't want to hear this, and it sure isn't in vogue, but--absolutely--we're going to fight in space. We're going to fight from space and we're going to fight into space. (Grossman 2000)

The United States needs to continue research and development and continually address the policy and doctrine issues that will eventually lead to development, deployment and fielding of a mature space weapons capability. The results in the charts above can help show policy makers where the chief concerns will be making this a viable road for the future.

The Commissioners appreciate the sensitivity that surrounds the notion of weapons in space for offensive or defensive purposes. They also believe, however, that to ignore the issue would be a disservice to the nation. The Commissioners believe the U.S. government should vigorously pursue the capabilities called for in the National Space Policy to ensure that the President will have the option to deploy weapons in space to deter threats to and, if necessary, defend against attacks on U.S. interests. (Commission to Assess United States National Security Space Management and Organization 2001, 63)

A Possible Solution?

According to Walter McDougal in the *Heavens and the Earth*, the Outer Space Treaty was modeled after the successful Antarctic Treaty (McDougal 1997, 181). The

Antarctic Treaty has kept the continent weapons-free and for the peaceful scientific uses of all nations of the world. When the Antarctic Treaty was written, seven nations laid claims to different parts of the territory. The U.S. is the only nation that has the capability to “range” the Antarctic continent. It also occupies the strategic center of gravity of the Antarctic continent, the South Pole. By occupying the South Pole, the US has a presence in the territorial claim of every nation. This presence is maintained through a strategic resource no other nation has: the Lockheed LC-130 ski-equipped cargo aircraft.

Similar to the strategic situation in Antarctica, the U.S. has the capability within the next ten years to dominate space as no nation can. Mastery can be accomplished in a peaceful way, by developing strategic transportation assets that will permit the United States to “range” the space AOR. In this manner, a potent arsenal of space weapons can await rapid deployment on the ground, as long as the strategic transportation assets will allow rapid constitution of space-based deterrent forces. This same strategic transportation asset would ensure economic dominance of space as well, giving US.corporations unfettered access to the final frontier. Routine access to space, like flying an airplane today, would allow domination without weaponization. In the future, that access will allow the United States to dominate the final frontier and keep it a place safe for the use of all mankind.

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